

GENERAL DYNAMICS

Land Systems Division

P.O. Box 1743, Warren, Michigan 48090

Inter-Office Memo

To: Distribution

Date 11-26-84

From: Data Management

Subject: DATA SUBMITTAL

Reference: 1) Prime Contract C0178 M1E1

NON-CDRL 53

Work Directive No. TB112601

Date Received 11-19-84

Data Item Title Deep Water Fording Kit
Life Cycle Cost Analysis
Report

Report No. TA-80-/8421-064

P.A. Losinski 499-08-06, 583-5064

DISTRIBUTION

Government (6)

M. J. Morris

K. T. Ellies

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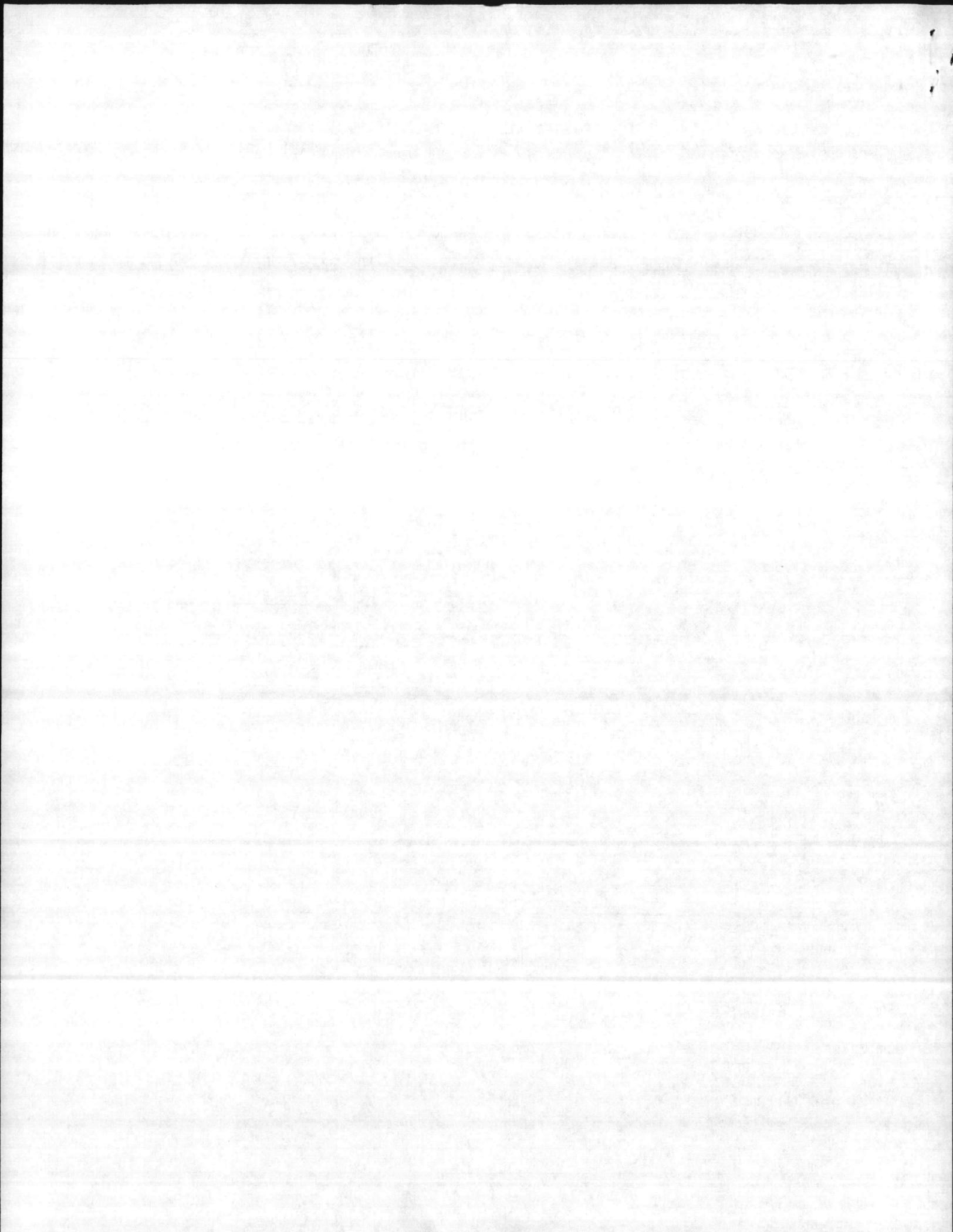
J. A. Sanders

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H. Rinna



GENERAL DYNAMICS

NTX-27738

Land Systems Division

P O Box 1743, Warren, Michigan 48090

26 November 1984

Ms. Joann Rosky, AMSTA-IRSB
U.S. Army Tank Automotive Command
Warren, Michigan 48090

Dear Ms. Rosky:

Subject: Deep Water Fording Kit
Life Cycle Cost Analysis Report

Reference: Contract DAAE07-80-C-0178, M1E1
Work Directive TB112601

Please be advised that six copies of subject report,
Document TA-80-/8421-064, have been transmitted to the
Government on this date.

Sincerely,

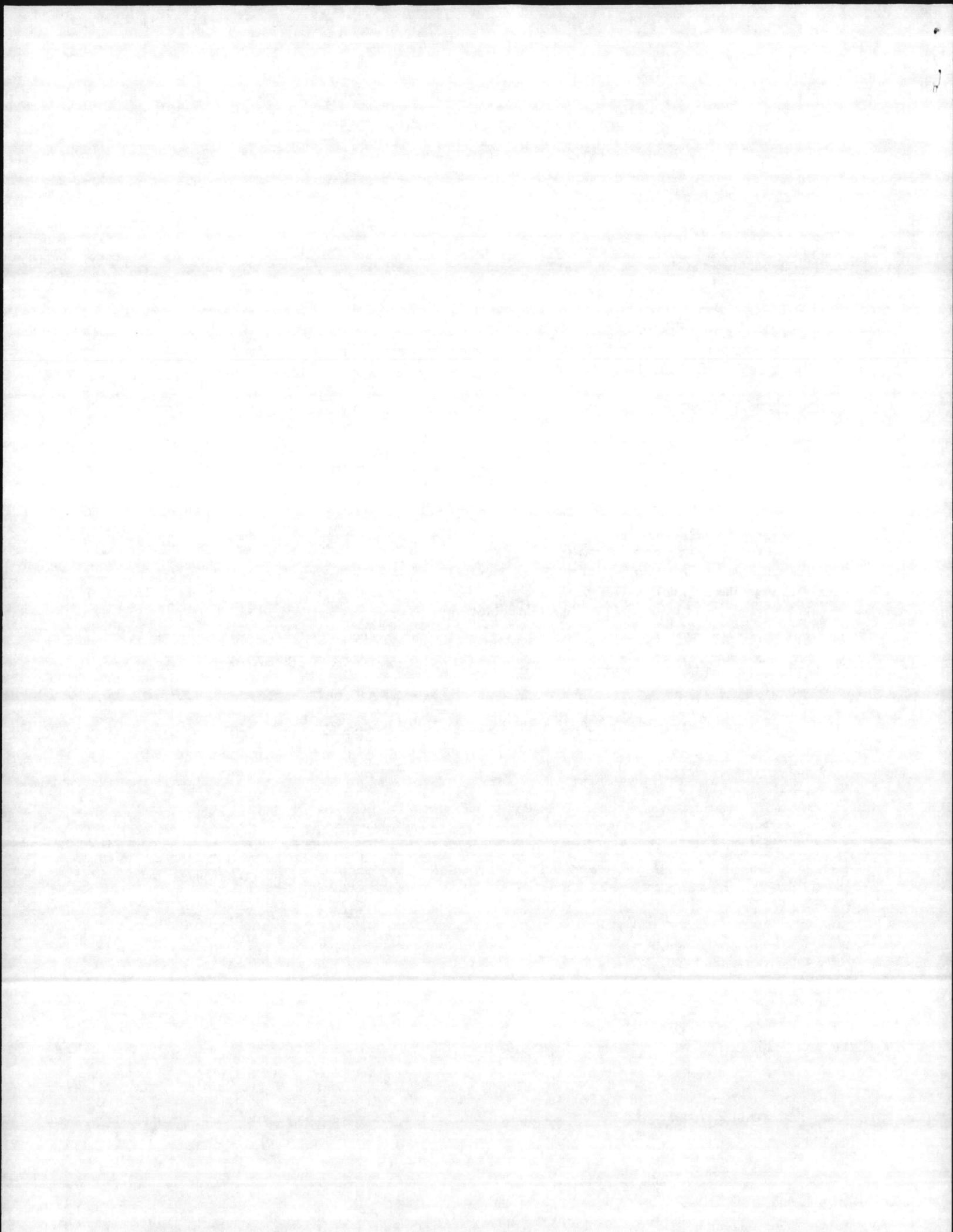
GENERAL DYNAMICS LAND SYSTEMS INC.



J. W. Crawford
Senior Contract Administrator

PAL/lS

L. T. Gerback, AMCPM-GCM-SM
R. A. Patek, AMCPM-GCM-S
R. M. McCullough, AMCPM-GCM-S
J. J. Karavias, AMCPM-GCM-SI
P. J. Leitheiser, AMCPM-GCM-OR
Major Clark Ansel, AMCPM-GCM-USMC-LNO





FSED PROGRAM OF THE M1E1 TANK

CONTRACT DAAE07-80-C-0178

**DEEP WATER FORDING KIT
LIFE CYCLE COST ANALYSIS REPORT**

DOCUMENT TITLE

PREPARED BY K. T. Ellies

APPROVED BY M. J. Morris

TA-80-/8421-064

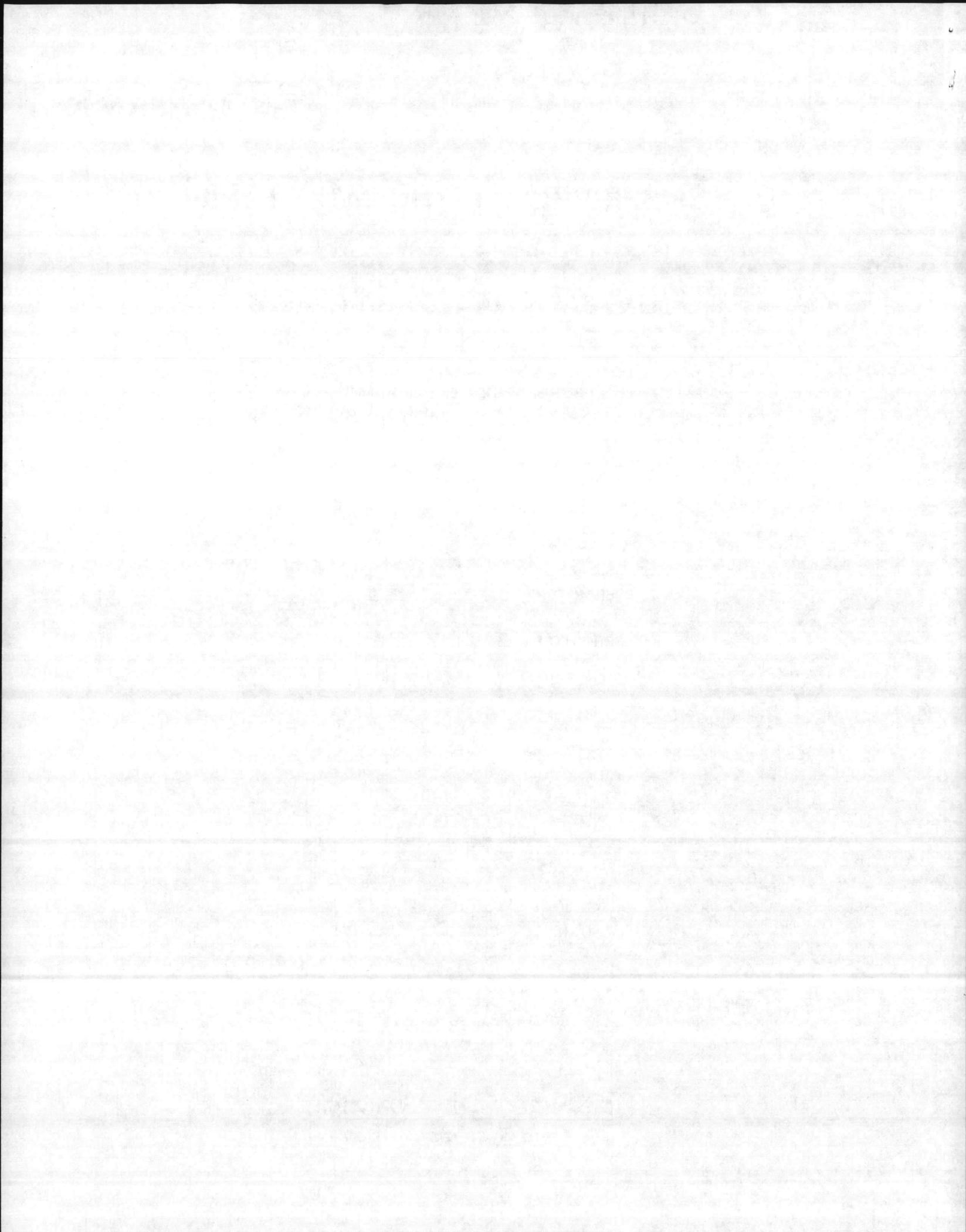
DOCUMENT NUMBER

WORK DIRECTIVE TB 112601

NOVEMBER 1984

DATE

GENERAL DYNAMICS
Land Systems Division



DEEP WATER FORDING KIT LIFE CYCLE COST ANALYSIS REPORT

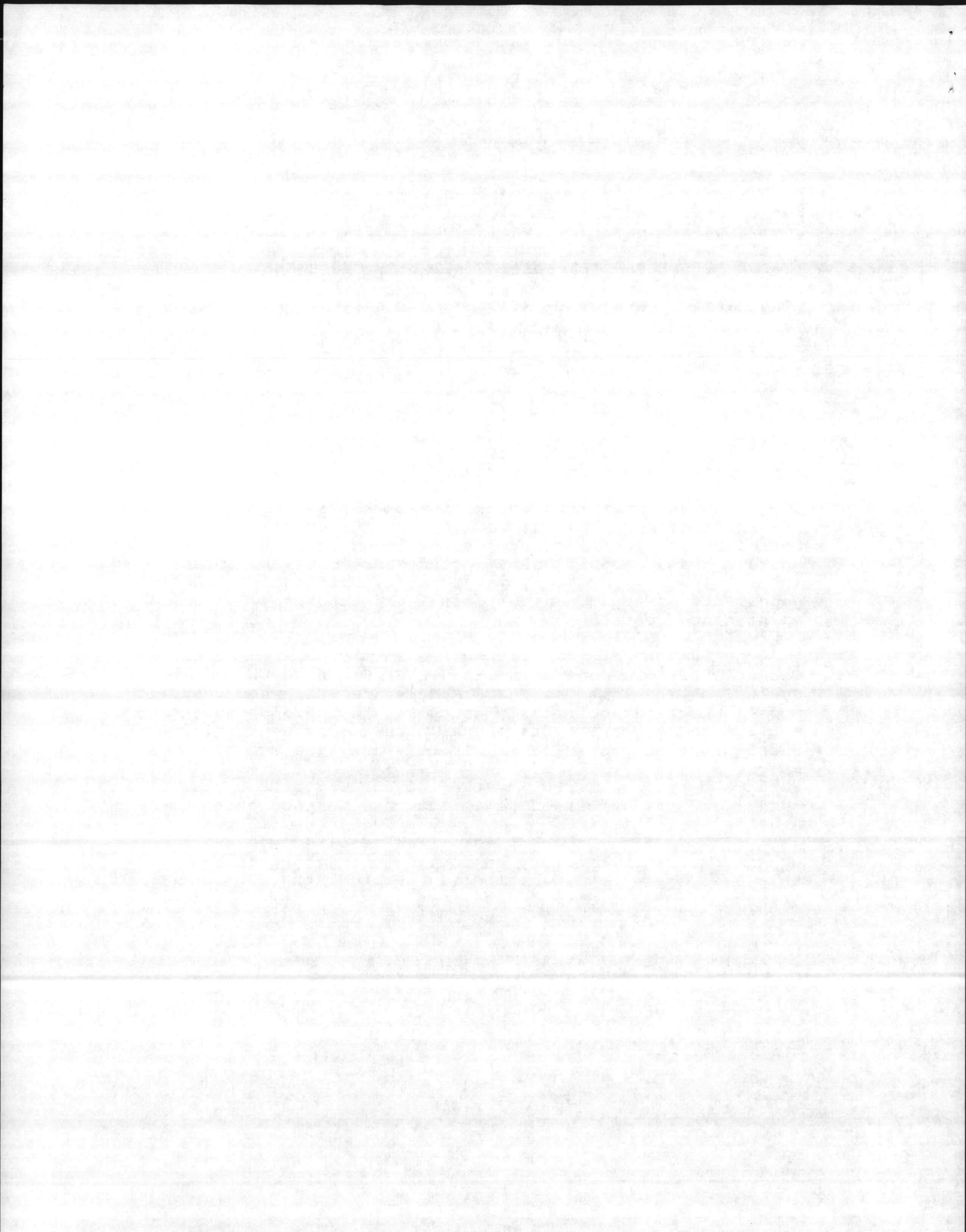
1. A preliminary life cycle cost estimate for the Deep Water Fording kits has been completed. The results of this analysis are summarized in Table 1. below.

TABLE 1. DEEP WATER FORDING KIT LIFE CYCLE COST

(Thousands of 1984 \$ - Include G & A 5% and Fee 10%)

<u>Development</u>	<u>Production</u>	<u>Support</u>	<u>Total</u>
\$ 290	\$ 5332	\$ 2312	\$ 7934

2. The Development costs include design engineering and prototype manufacturing costs associated with two (2) prototype kits. The Production costs include recurring and non-recurring costs of 600 Deep Water Fording Kits. The recurring Manufacturing costs of each kit is \$6375 per kit. The Production costs also include initial spares, inventory introduction costs, and support equipment costs. The Operating and Support costs include the costs of replenishment spares, inventory maintenance, maintenance labor, supply storage and transportation, and support equipment maintenance costs.
3. The analysis was done using the PRICE H and PRICE L Life Cycle Cost Models. The PRICE Models are RCA owned computer models which parametrically calculate the development, production and support costs of new hardware. The Development and Production costs are mainly driven by the weight, volume and complexity of the hardware being costed. The Support costs are driven by the reliability of the system (MTBF) and the number of new parts that must be entered into the supply system. All input parameters required for the model were engineering estimates supplied by lead engineers and reliability engineers. Since the results of this analysis were parametrically derived, they should be viewed on a relative basis of comparison rather than accept as actuals.



- - - PRICE 84 - - -
MECHANICAL ITEM

DATE 12-NOV-84

TIME 10:55
(184275)

FILENAME: QWF

DEEP WATER FORDING KIT

PRODUCTION QUANTITY	600	UNIT WEIGHT	172.40	MODE	2
PROTOTYPE QUANTITY	2.000	UNIT VOLUME	13.10	QUANTITY/NHA	1

UNIT PROD COST	6.37	COST PROCESS FACTOR	0	MONTHLY PROD RATE	12.48
----------------	------	---------------------	---	-------------------	-------

PROGRAM COST(\$ 1000)	DEVELOPMENT	PRODUCTION	TOTAL COST
ENGINEERING			
DRAFTING	39.	1.	40.
DESIGN	133.	2.	135.
SYSTEMS	20.	-	20.
PROJECT MGMT	33.	667.	699.
DATA	9.	219.	228.
SUBTOTAL(ENG)	233.	889.	1122.
MANUFACTURING			
PRODUCTION	-	3825.	3825.
PROTOTYPE	47.	-	47.
TOOL-TEST EQ	10.	24.	34.
SUBTOTAL(MFG)	57.	3849.	3906.
TOTAL COST	290.	4738.	5028.

DESIGN FACTORS	MECHANICAL
WEIGHT	172.400
DENSITY	13.160*
MFG. COMPLEXITY	4.848
NEW DESIGN	0.500
DESIGN REPEAT	0.000
EQUIPMENT CLASS	0.000*
ENGINEERING CHANGES	0.0005*
INTEGRATION LEVEL	0.0

PRODUCT DESCRIPTORS	
ENGINEERING COMPLEXITY	1.000
PROTOTYPE SUPPORT	1.0
PROTO SCHEDULE FACTOR	0.250*
PLATFORM	1.400
YEAR OF TECHNOLOGY	1985*
RELIABILITY FACTOR	0.0
INTERFIELD	1175*

SCHEDULE	START		FIRST ITEM		FINISH	
DEVELOPMENT	NOV 84	0	NOV 84*	30	DEC 87	30
PRODUCTION	NOV 84	120	DEC 88	48	DEC 92	60

SUPPLEMENTAL INFORMATION	
YEAR OF ECONOMICS	1984
ESCALATION	0.00
T-1 COST	11.96*
AMORTIZED UNIT COST	7.90*
DEV COST MULTIPLIER	1.15
PROD COST MULTIPLIER	1.15

TOOLING & PROCESS FACTORS	
DEVELOPMENT TOOLING	1.00*
PRODUCTION TOOLING	1.00*
RATE TOOLING	0
PRICE IMPROVEMENT FACTOR	0.930
UNIT LEARNING CURVE	0.922*

COST RANGES	DEVELOPMENT	PRODUCTION	TOTAL COST
FROM	255.	4031.	4286.
CENTER	290.	4738.	5028.
TO	351.	5912.	6264.

PRICE LIFE CYCLE COST

(184283)

11/12/84

10:59:13

DEEP WATER FORDING KIT

LIFE CYCLE FILENAME: DWFL
DEPLOYMENT FILENAME: DWFLD
GLOBAL FILENAME:

MCMIX FILENAME:
DATA CHANGE FILENAME:
POST-PROCESSOR FILENAME:

MTBF	1176	MTR-LRU	3.6	MOD TYPES/LRU	0	LRUS/EQUIP	1
RATIO (1)	1.00	-MODULE	0.0	PART TYPES/LRU	40	LRU FAIL ALLOW	0
RATIO (2)	1.00						

MAINTENANCE CONCEPT 10
REPLACE PARTS AT ORGANIZATION.

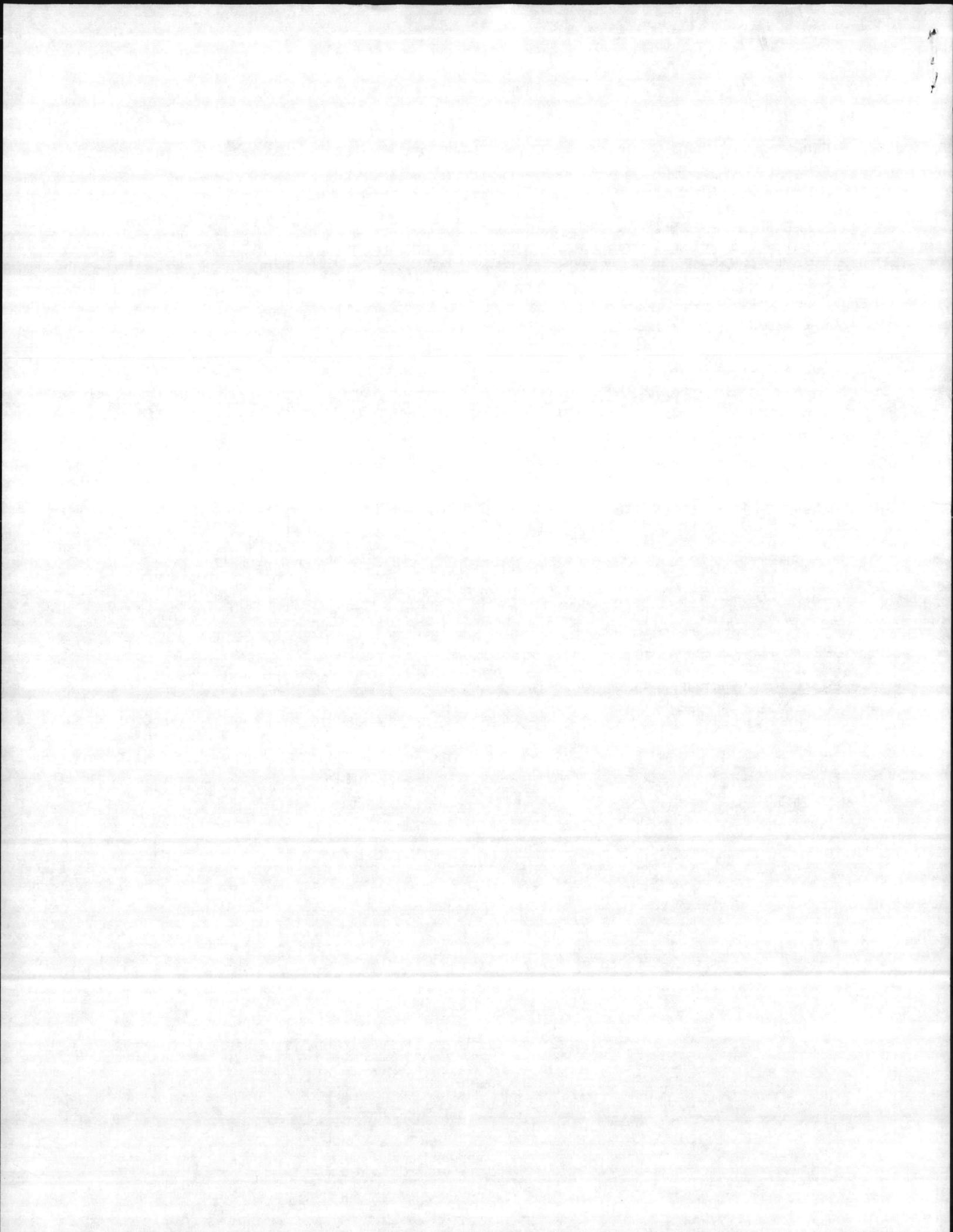
PROGRAM COST	DEVELOPMENT	PRODUCTION	SUPPORT	TOTAL
EQUIPMENT	290	5017	***	5307
SUPPORT EQUIPMENT	***	0	0	0
SUPPLY	***	115	977	1092
SUPPLY ADMIN.	***	200	1000	1200
MANPOWER	***	***	238	238
CONTRACTOR SUPPORT	***	***	0	0
OTHER	0	***	97	97
TOTAL COST	290	5332	2312	7934

OPERATIONAL AVAILABILITY 0.9996

OPERATIONAL READINESS 0.9996

SUPPORT EQUIPMENT	ORG	INT	DEPOT
NUMBER OF SETS	14	0	0
UTILIZATION	0.815	0.000	0.000
LOAD FACTOR	0.036	0.000	0.000

SUPPLY	UNITS	MODULES/TYPE	PARTS/TYPE
INITIAL	0	0	18
BALANCE CONSUMED	0.00	0.00	184.994



GENERAL DYNAMICS

Land Systems Division

P.O. Box 1743, Warren, Michigan 48090

Inter-Office Memo

To: Distribution Date 9-17-84
From: Data Management
Subject: DATA SUBMITTAL

Reference: 1) Prime Contract C-0178 M1E1

Work Directive TB112601
TB112602

Data Item No. NON-CDRL 50

Date Received 9-12-84

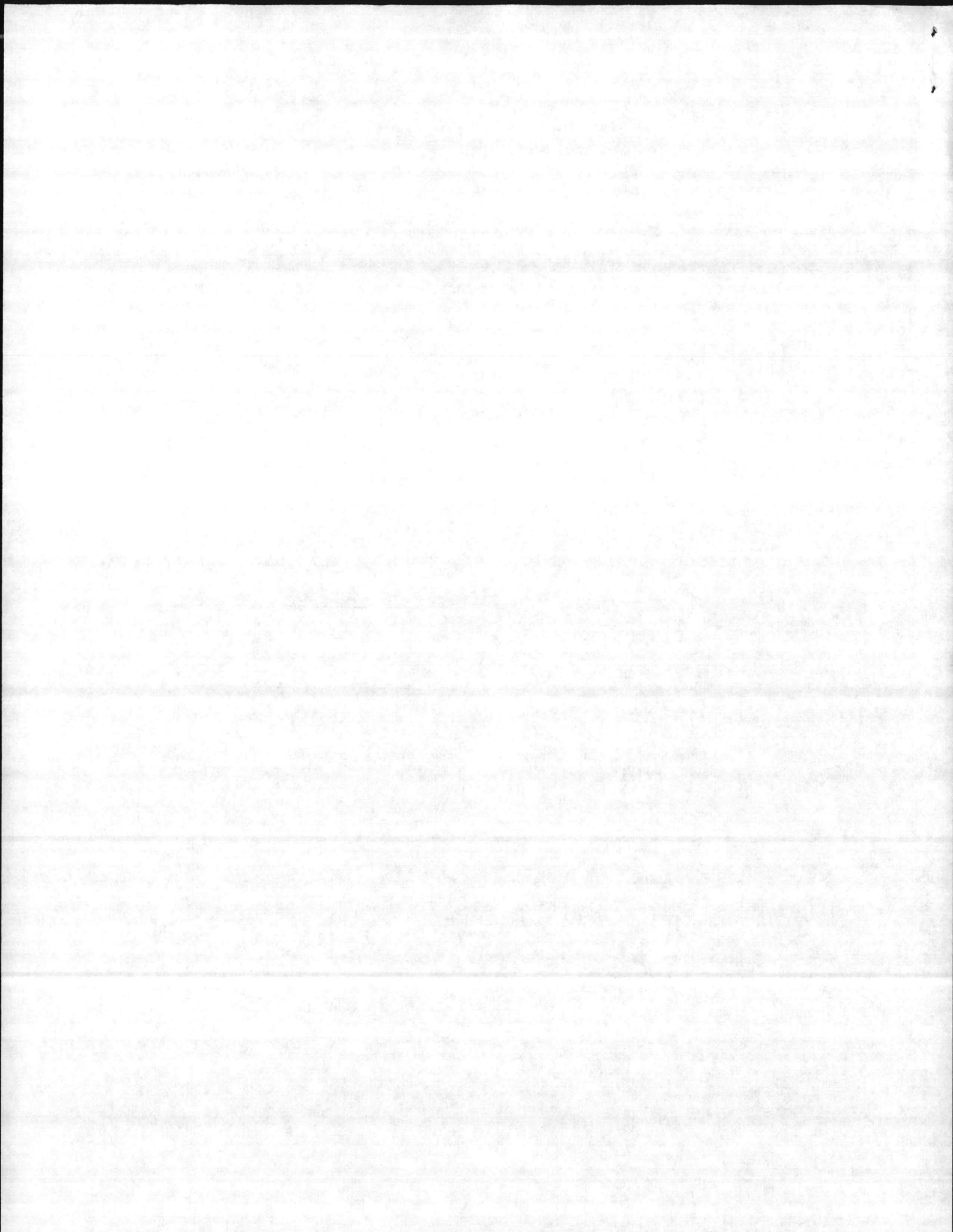
Data Item Title Internal Test Report-48 Hrs. Salt F.
Final Test Report-M1E1 & JEFF-B

Report No. TA-80-/4021-061, TA-80-/4021-062

P.A. Losinski 499-08-06, 583-5064

DISTRIBUTION

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R. M. Brayer
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F. H. Renaud
J. J. Ruma
R. C. Wagner
Library
D/M File
Letter only: W. C. Beamer
G. Salvador



GENERAL DYNAMICS

NTX-27146

Land Systems Division

P.O. Box 1743, Warren, Michigan 48090

17 September 1984

Ms. Joann Rosky DRSTA-IRSB
Department of the Army
U. S. Army Tank - Automotive Command
Warren, Michigan 48090

Dear Ms. Rosky:

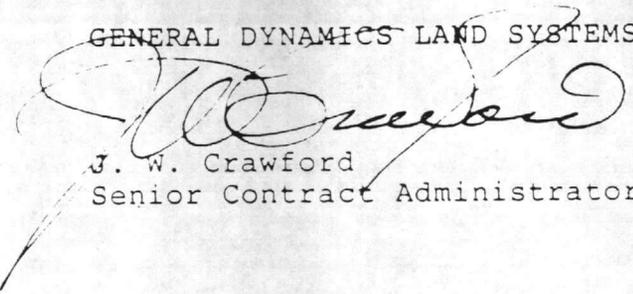
Subject: Interim Test Report - 48 HOUR SALT FOG and
Final Test Report - M1E1 and JEFF-B (LCAC)

Reference: Contract DAAE07-80-C-0178 M1E1
Work Directives TB112601 and TB112602

Please be advised that four copies each of subject reports,
Documents TA-80-/4021-061 and TA-80-/4021-062 have been
transmitted to the Government on this date.

Sincerely,

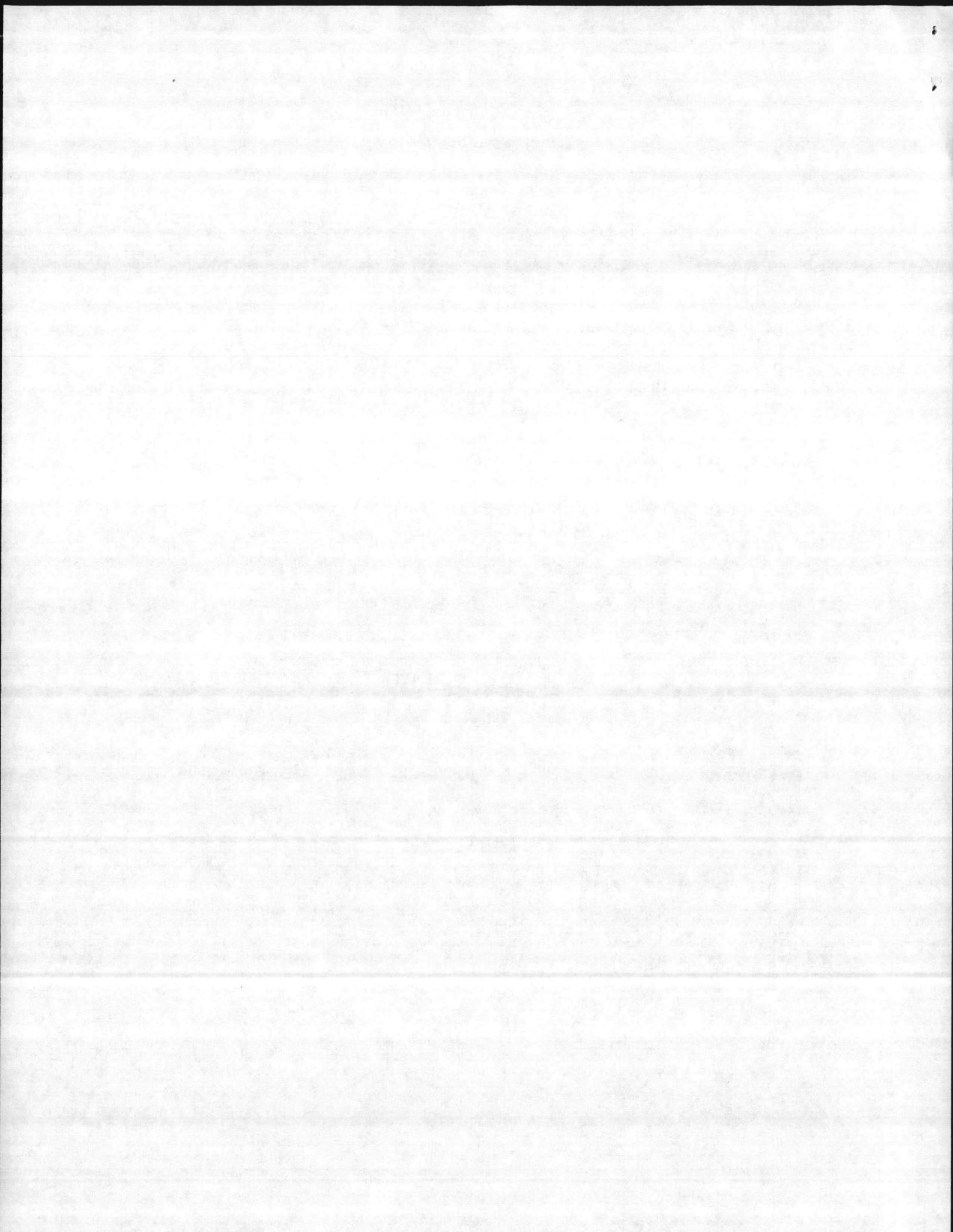
GENERAL DYNAMICS LAND SYSTEMS INC.



J. W. Crawford
Senior Contract Administrator

PAL/lh

DRCPM-GCM-QT, A.F. Capparelli, Jr.
DRCPM-GCM-SM, L. T. Gerback
DRCPM-GCM-QR, P. J. Leitheiser
DRCPM-GCM-S, R. A. Patek





FSED PROGRAM OF THE M1E1 TANK

CONTRACT DAAE07-80-C-0178

FINAL COMPATIBILITY TEST REPORT
FOR THE M1E1 AND JEFF-B (LCAC)

DOCUMENT TITLE

PREPARED BY F. H. Renaud

APPROVED BY M. J. Morris
M. J. Morris

TA-80-/4021-061

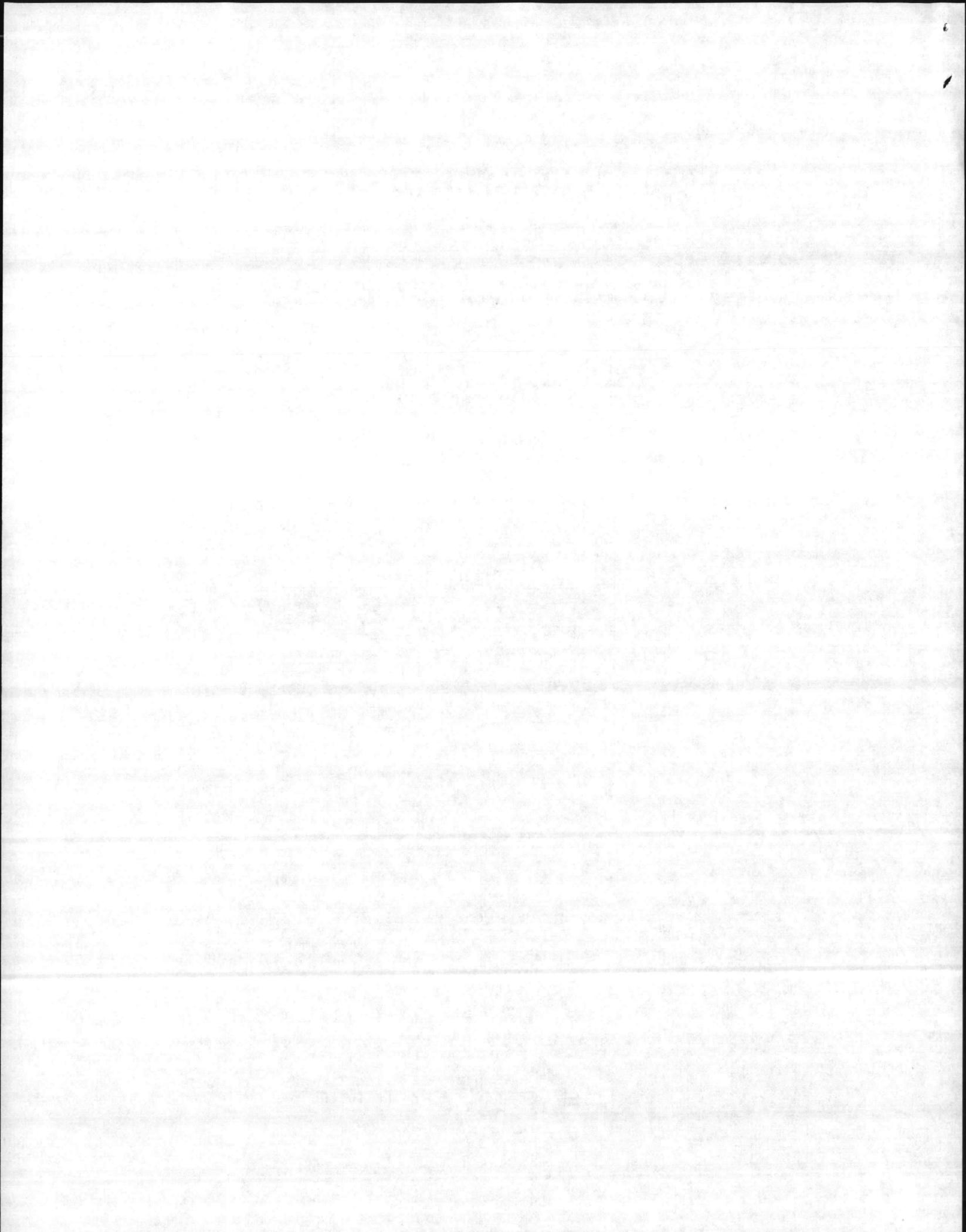
DOCUMENT NUMBER

WORK DIRECTIVE TB112601

SEPTEMBER 1984

DATE

GENERAL DYNAMICS
Land Systems Division



Final Compatibility Test Report for the
M1E1 and the JEFF-B (LCAC)

1.0 References

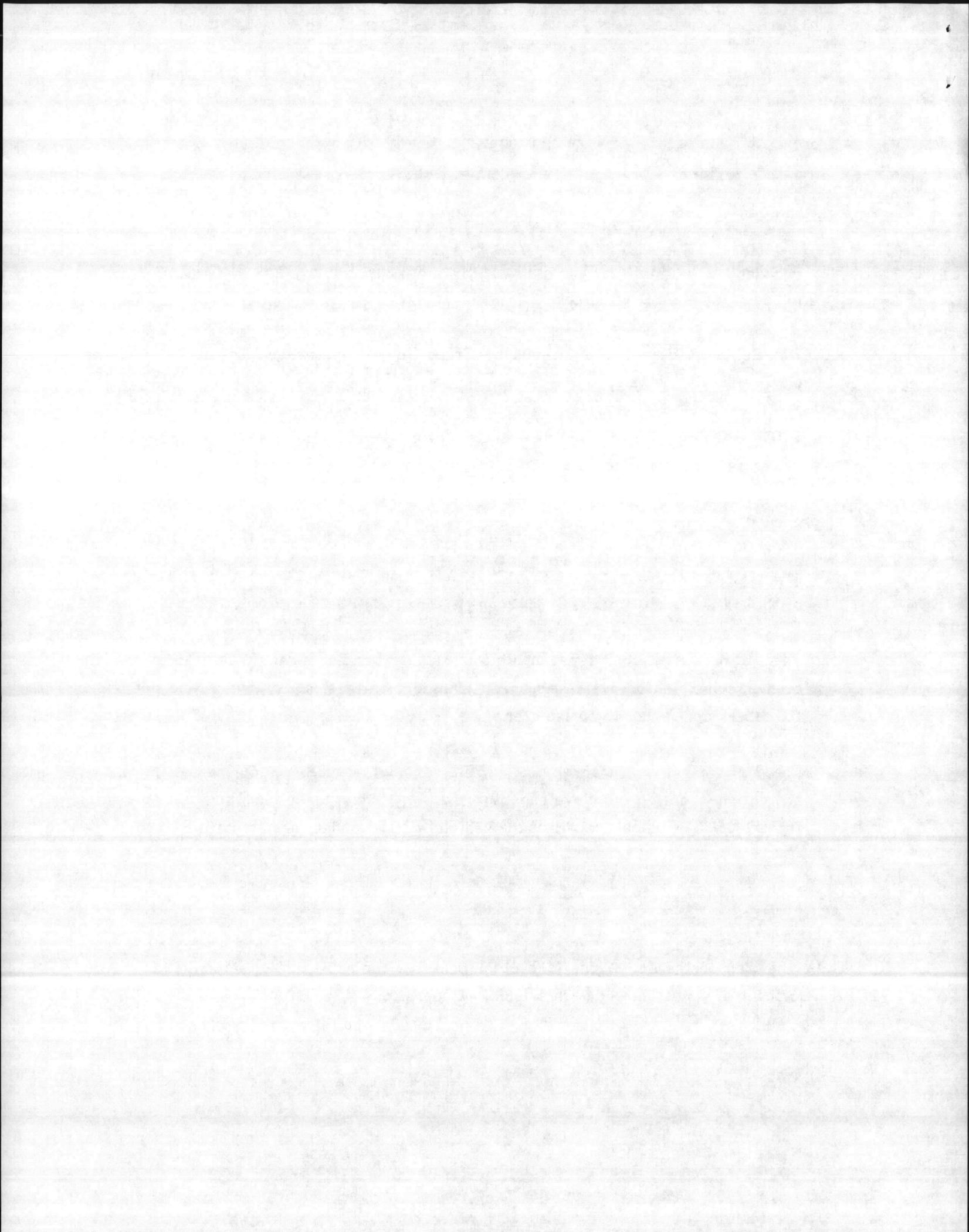
- a. Independent Evaluation Plan (IEP) for Marine Corps Unique Operational Testing (OT) of the M1E1 Main Battle Tank.
- b. Detailed Test Plan (DTP) for Marine Corps Unique Operational Testing (OT) of the M1E1 Main Battle Tank.
- c. DRCPM-GCM, USMC-LNO Memorandum for Record Subject: M1E1 and JEFF-B Hovercraft Compatibility Test.

2.0 Background

- a. The test was authorized by Contract DAA E07-80-C-0178 CLIN 6 to perform Phase I of the Marine Corps Unique Operational Testing (OT) Plan dated July 1984.
- b. The JEFF-B is a US Navy Amphibious Assault Landing Craft that utilizes the air cushion principle for over-the-horizon transport of tactical equipment and personnel for debarkment at an objective area.
- c. The M1E1 tank is a tracked low profile, combat assault vehicle possessing armor protection, shoot on the move capability, with a 120mm main gun which is traversable through 360°. Combat weight of the vehicle with secondary armament is 63.5 tons.

3.0 Objectives

To assess the transportability of the M1E1 tank by LCAC and to examine its ability to deploy and traffic beach areas associated with amphibious operations.



4.0 Scope

Examine the ability of the vehicle to be loaded and unloaded over the bow and stern ramps of the craft and maneuver within and between stowage and machinery spaces on deck for positioning and tie down.

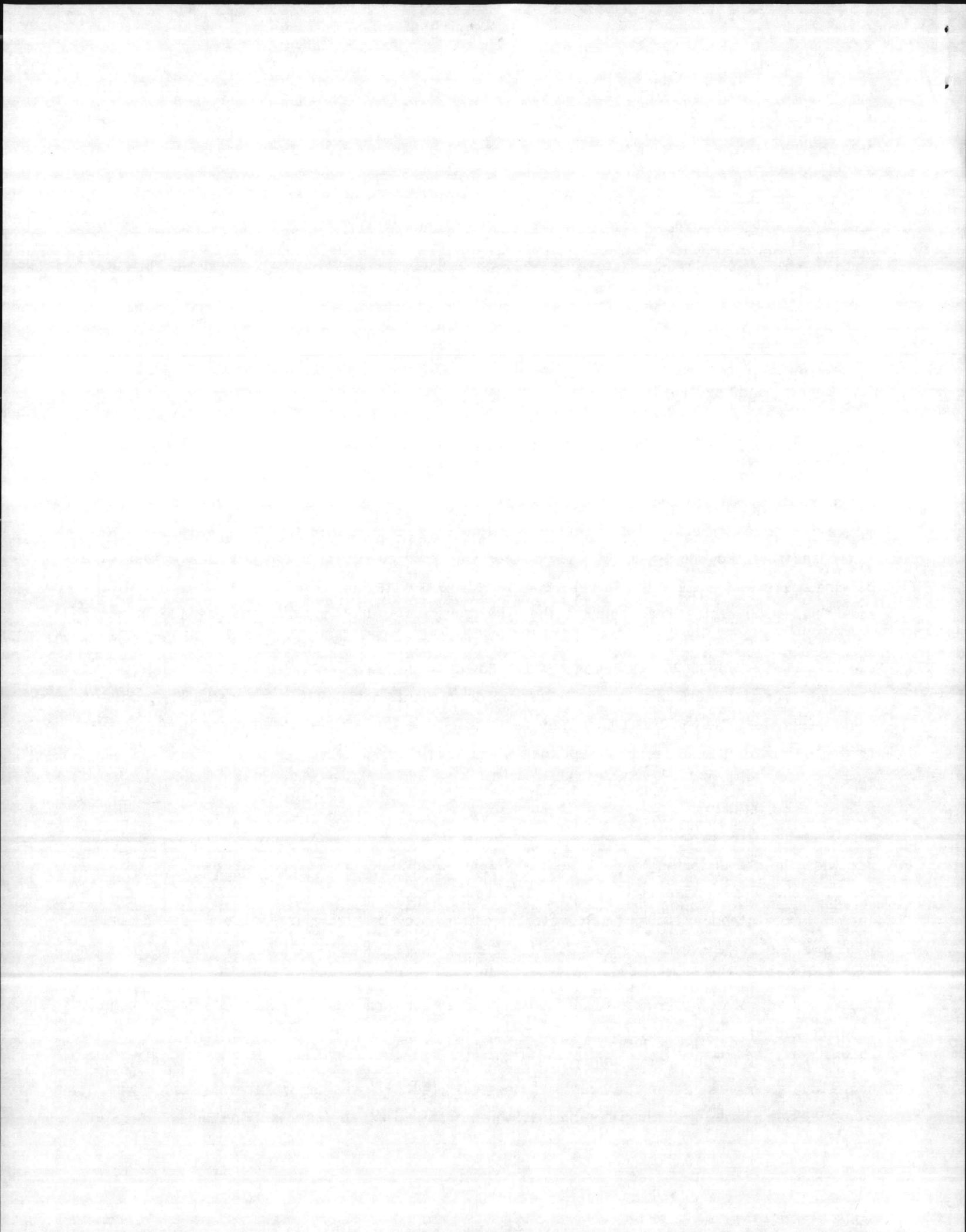
5.0 Test

5.1 Loading and Securing

Tests with the JEFF-B and M1E1 120-9 began on 7-19-84 at Eglin AFB, Ft. Walton Beach, FL. The craft was beached approximately 100 ft. from the shoreline and the M1E1 was loaded over the stern ramp onto the cargo deck. When spotting the vehicle, longitudinal and lateral center of gravity values were used for optimum positioning to produce best trimming when under way. After shutting the engine down, the vehicle was configured for transport as follows: the parking brake was set, and the turret azimuth lock was engaged, with the gun forward and fully elevated. Hull drains were opened, the wind sensor was left up, and the grenade launcher covers were removed to prevent loss due to the turbulent air generated by the craft when under way. Twenty-two 35000 lbs. capacity tie downs were used for securing the vehicle, eight forward, four aft, and five to a side. Ref. tie down plan, enclosure 1, for detail. Tie points on the vehicle were the No. 1 left and right skirt struts, the final drive hubs, and the front and rear towing eyes. Additional securing appendages are not required.

5.2 Transportability

For the 2 hour trip to the Naval Coastal Systems Command (NCSC) at Panama City, FL., sea states in the Gulf were reported to be at 1.5, a numerical value used to describe wind and wave action. Due to concerns about salt water ingestion into the engine air intake area while under way, six rain gages were mounted at strategic locations around the inlet on the top deck to measure water fall. However, little water was collected, thus concerns could not be substantiated. Most water resulted from a bow spray forward which washed up onto the vehicle exterior and was not a problem. At sea, the vehicle engine was started three times to check its performance in a Marine environment. No problems were encountered. Due to extremely high noise levels experienced on the craft's cargo deck (140 D-B was reported) while under way, it was necessary to monitor the Driver's Instrument Panel (DIP) to ascertain that an engine start



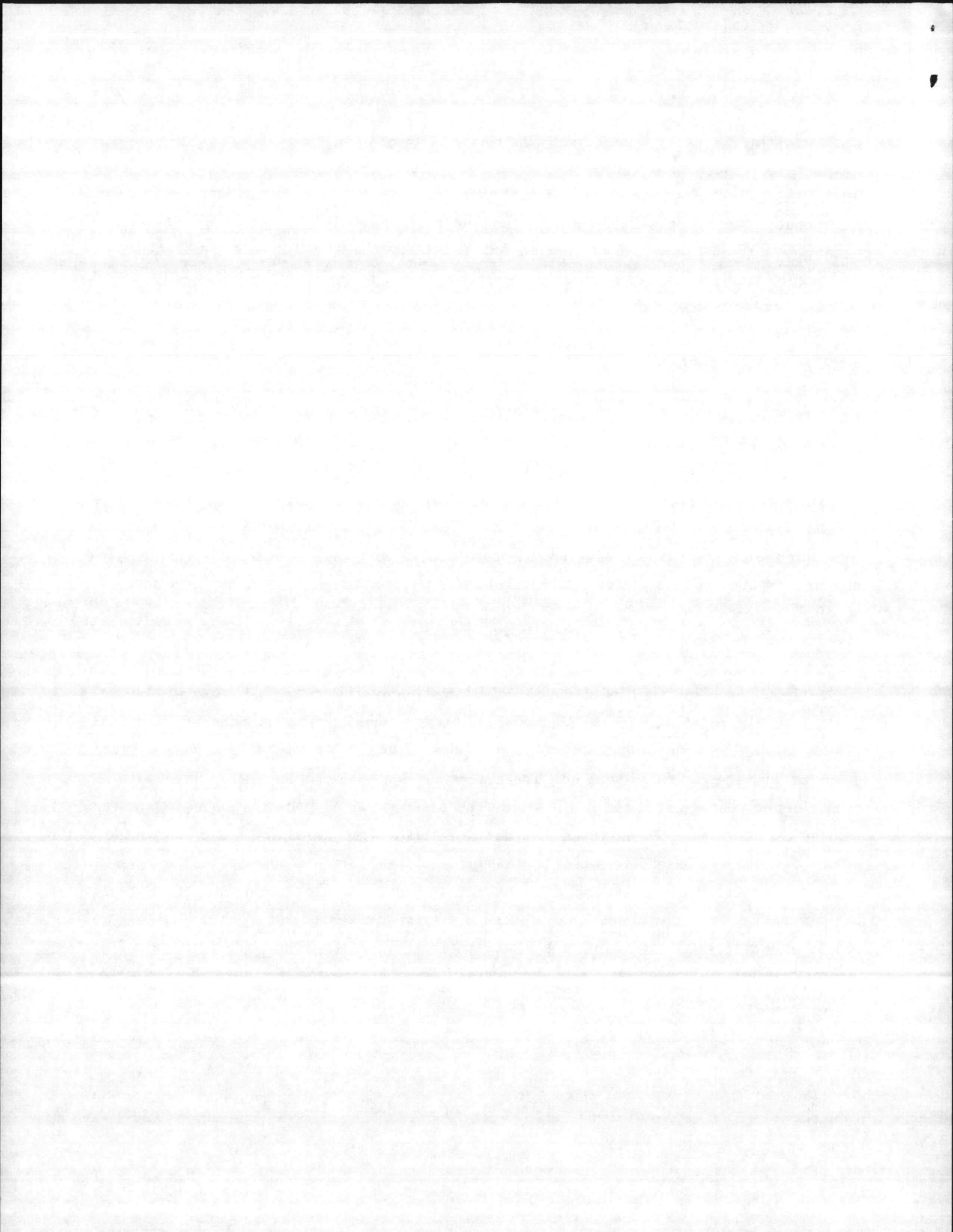
had been achieved. A total of 2 hours operation at idle was accumulated during the run. CVC helmets were checked at each crew station with the vehicle intercom system on, and no difficulties were experienced in hearing conversations in the high ambient noise levels. Additionally, the helmets did afford comfortable hearing protection against high noise level hazards when under way. Vibration on board, although not instrumented, did not pose a problem, with only a low frequency chop experienced while at sea and traveling at all speeds to 50 knots per hour.

5.3 Air Intake Inspection

After landing with the craft at Panama City, FL., a distance of 90 miles, the precleaner and "V" packs were removed and examined before weighing. No evidence of water was noted and the air box was also found to be clean and dry. Filter weights were found to be nominal and in the 39 lbs. range. The precleaner weighed 50 lbs. New units were installed to replace the old, which were returned for laboratory analysis. Findings are a matter of record. Room for removing the filters was limited while on board due to port and starboard interferences with machinery spaces. Unobstructed turret travel was estimated to be 75° in either direction.

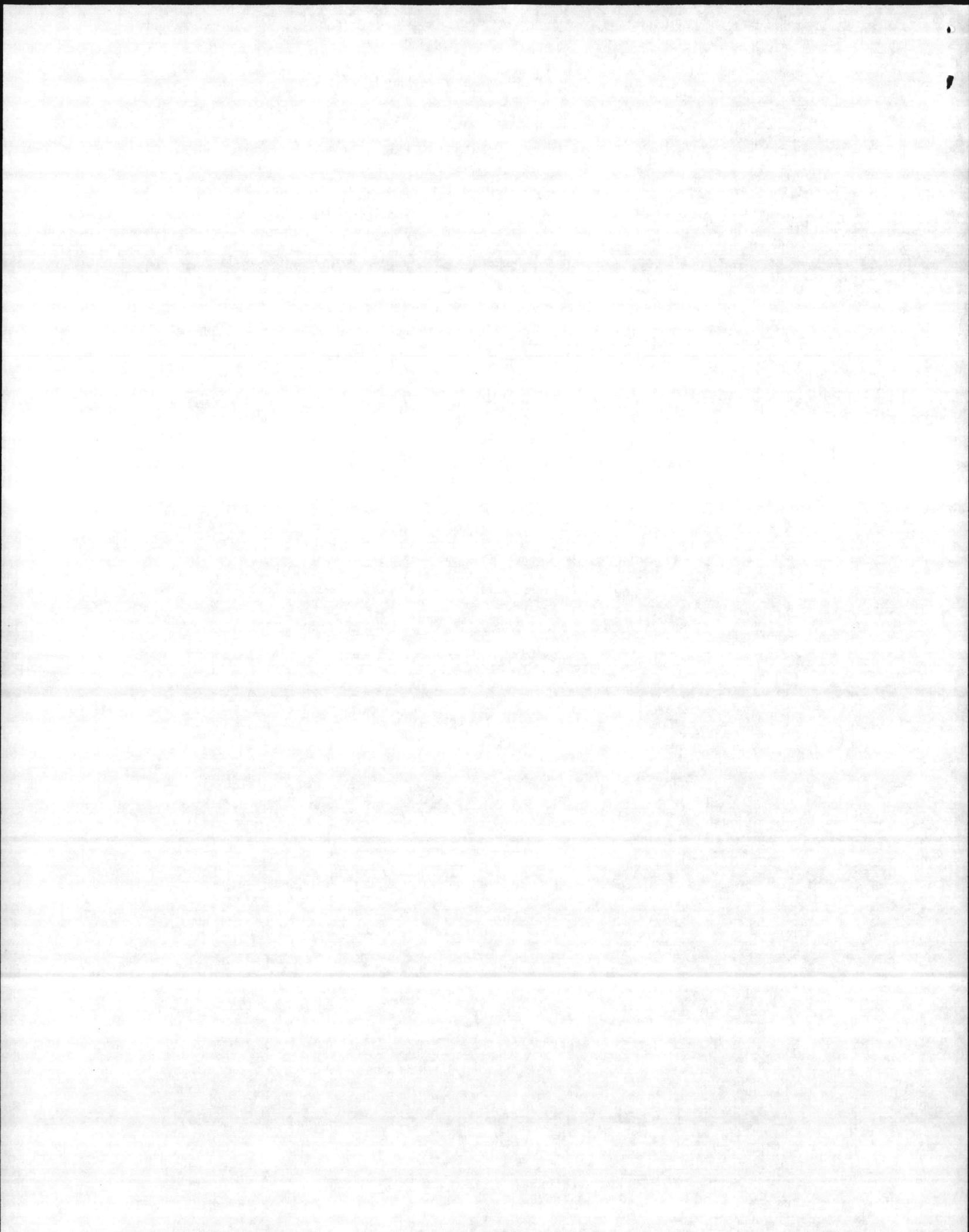
5.4 Amphibious Operations

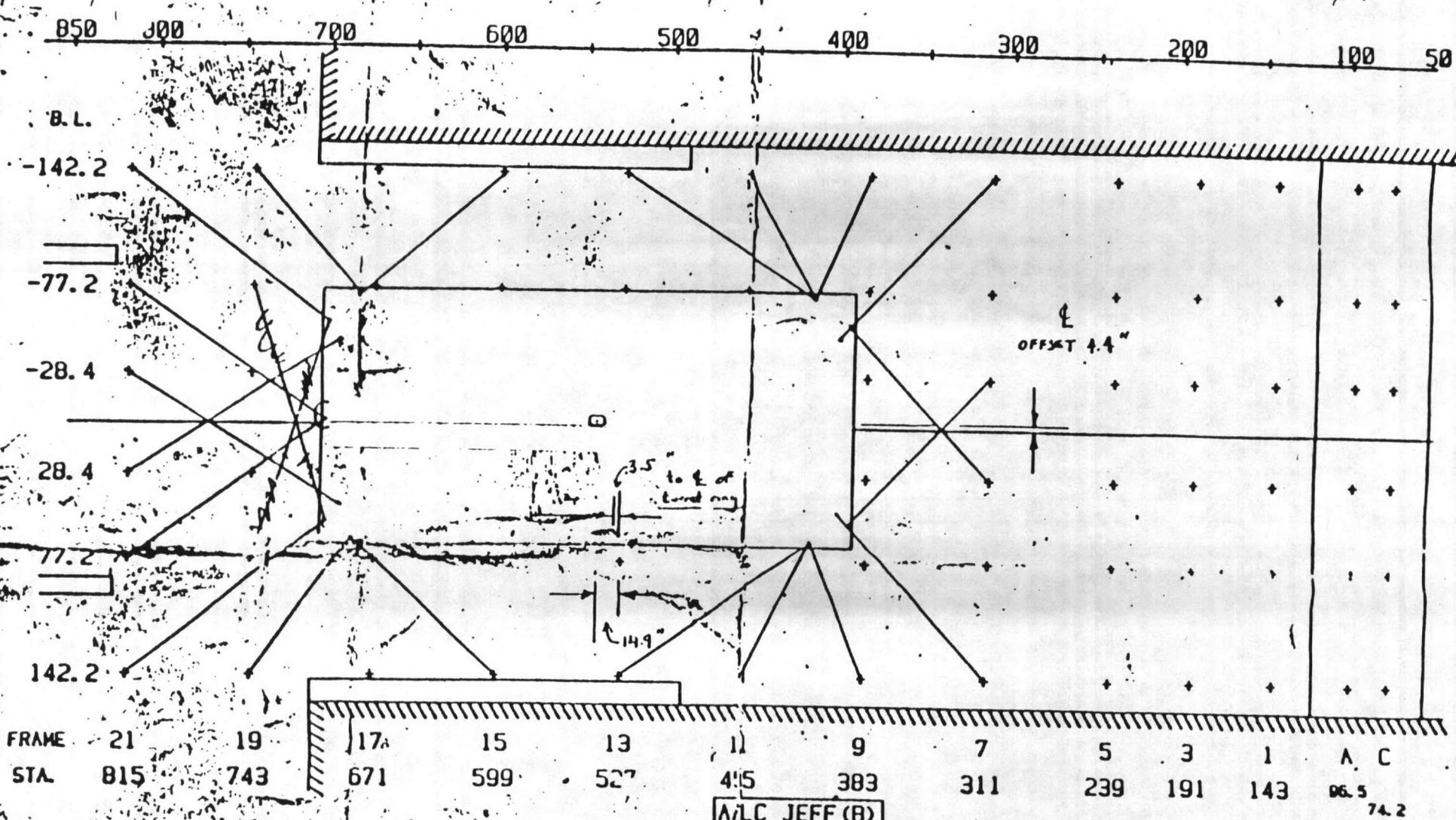
On 7-25-84 a second trail with the JEFF-B was completed in the St. Andrew Bay area contiguous to Tyndal AFB, FL. Maneuverability and securing exercises were timed. The vehicle was driven over the bow and stern ramps of the craft in the forward and reverse direction with the gun fully elevated. There were no clearance problems when negotiating the ramps and no dunnage required in the sand. The craft remained firmly in place with no ramp damage resulting from the exercise. Tie down exercises were timed and found to average 12 minutes, which is reasonable when considering the task; time to release the ties was 1.5 minutes. Exhaust temperature was not a hazard for personnel working on deck at the rear of the vehicle, as the heat was quickly dissipated. Vehicle tractability was demonstrated successfully in loose, fine sand during a 5 mile run and again at a second landing site over 3 foot (approximately) sand dunes, where loading and unloading exercises were repeated over the bow ramp. The stern ramp tests could not be done due to limited access to the craft from the shoreline.



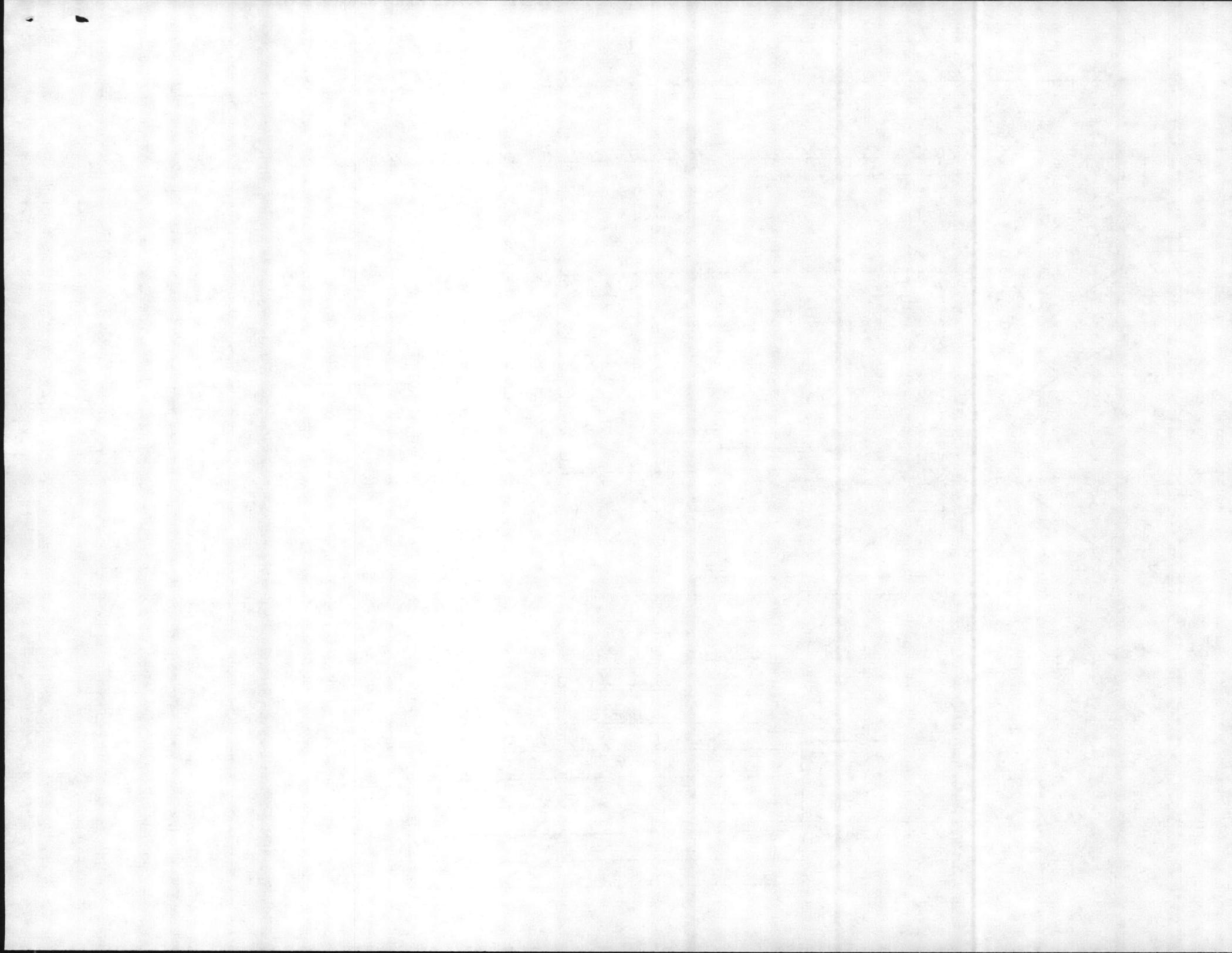
6.0 Summary of Results

The M1E1 tank and the JEFF-B (LCAC) are compatible. Issues outlined in the detailed test plan were successfully tested with no operational constraints to successful deployment of the M1E1 over the horizon.





NST-108-19 JUL 84
 CRAFT C.G. @ 495.0, -0.1
 MIEI TANK C.G. @ 541.9, -3.1





FSED PROGRAM OF THE M1E1 TANK

CONTRACT DAAE07-80-C-0178

INTERIM TEST REPORT FOR THE
48 HOUR SALT FOG, M1E1 120-9

DOCUMENT TITLE

PREPARED BY F. H. Renaud

APPROVED BY M. J. Morris
M. J. Morris

TA-80-/4021-062

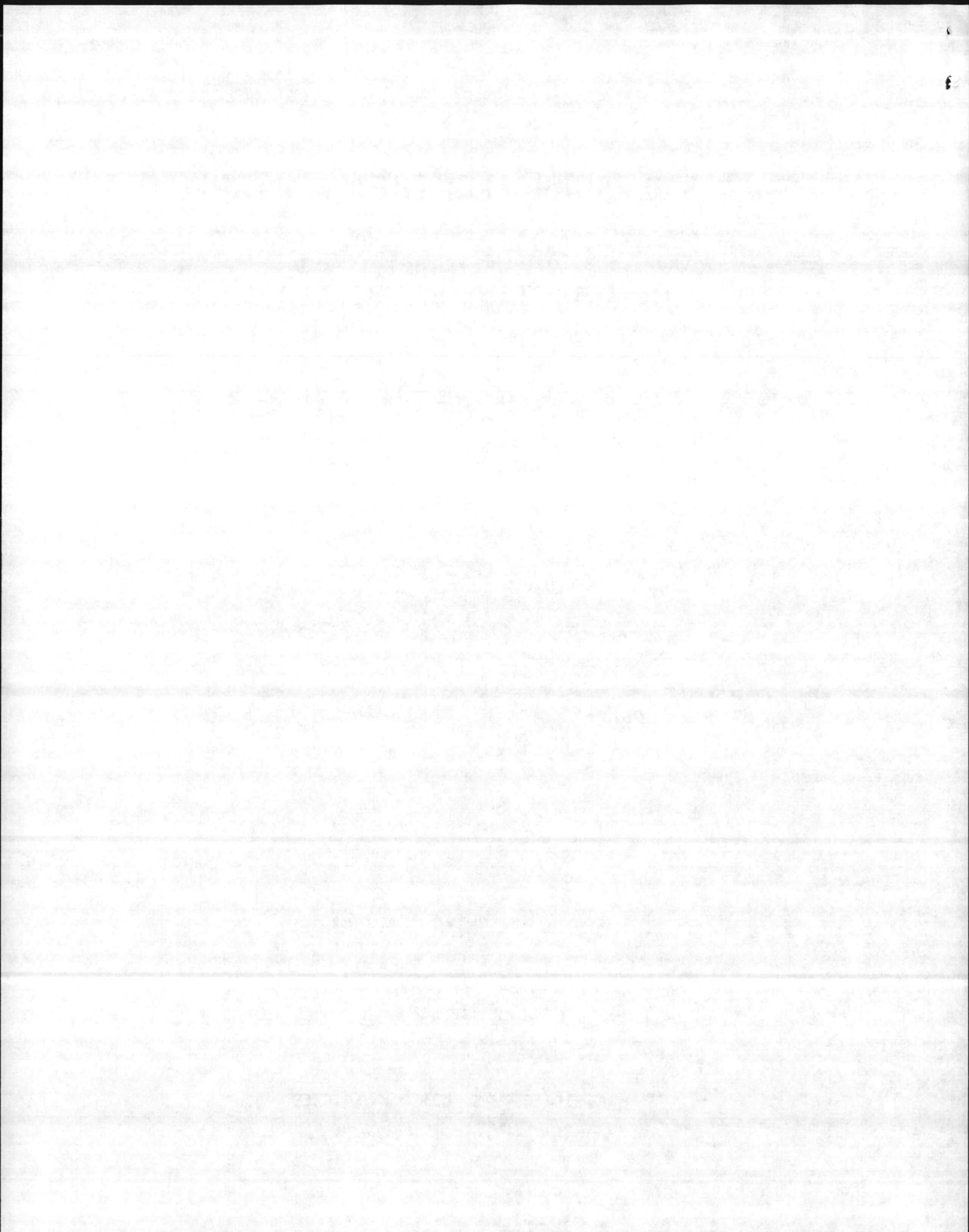
DOCUMENT NUMBER

WORK DIRECTIVE TB112602

SEPTEMBER 1984

DATE

GENERAL DYNAMICS
Land Systems Division



INTERIM TEST REPORT FOR THE
48 HOUR SALT FOG, M1E1 120-9

1.0 REFERENCE

- a. System Specification for Tank, Combat, Full-tracked, 120-mm Gun, Improved M1E1, General Abrams Volume 1, SA-X00003A, 15 September 1983.
- b. Salt Fogs MIL-STD-810C, 10 March 1985.

2.0 BACKGROUND

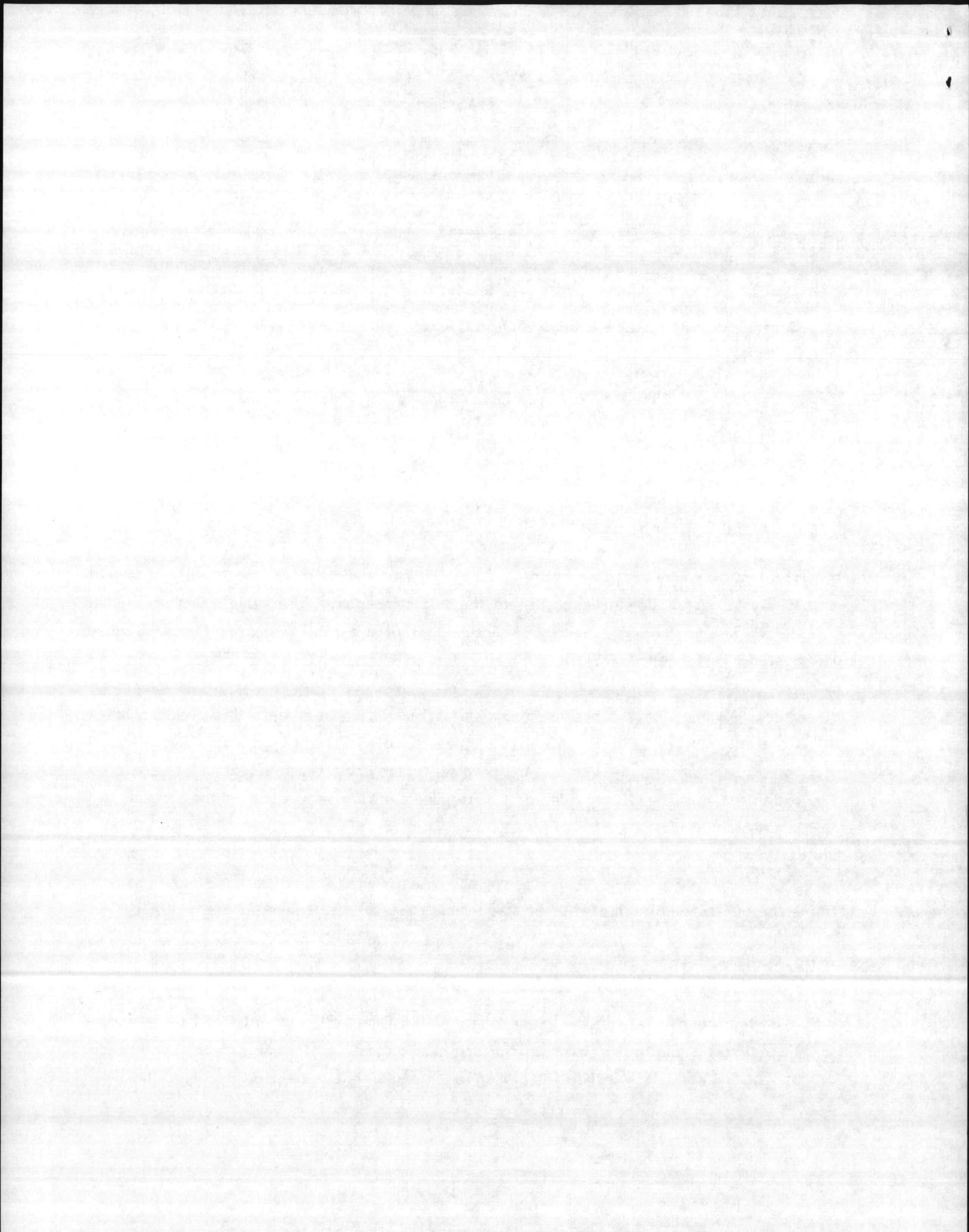
- a. The 48 Hour Salt Fog Test was authorized by Contract DAAE07-80-C-0178 to comply with the system specification for the Improved M1E1 Tank.
- b. The test was conducted at Eglin, A.F.B., Ft. Walton Beach, FL, on 10 July 1984 with M1E1, 120-9. Following exposure to the salt atmosphere, the vehicle was shipped to the U. S. Army, Aberdeen Proving Ground, MD, for durability testing by the Combat Systems Test Agency (CSTA).
- c. Due to Marine Corps concerns about the M1E1 System in an amphibious environment, Contract DAA-E07-80-C-0178 CLIN 6, was authorized to conduct a six month corrosion study on the vehicle to investigate the long term effects of the salt fog exposure. Results will provide additional judgement for acquisition of the system.

3.0 OBJECTIVE

Determine the resistance of vehicle systems and subsystems to a salt atmosphere.

4.0 PREPARATION FOR TEST

- a. A System Functional was performed using GDLS Quality Document QI-62 to determine system status and to develop pass/fail criteria for test. Deficiencies were documented by TACOM and GDLS inspection personnel on equipment Inspection Record 2404.



- c. Oil samples were taken from the engine, transmission, final drives, and hydraulic oil reservoir for laboratory analysis.
- d. Bare metal surfaces were prepared with lubricant to meet lube order requirements outlined in LO 9-2350-264-17.
- e. New air intake filters were weighed for record as follows:
 - Precleaner, 49-1/4 lbs.
 - "V" pack No., 1 38-1/4 lbs.
 - "V" pack No., 2 39 lbs.
 - "V" pack No., 3 38-3/4 lbs.

All unit weights were found to meet General Dynamics Spec. CX14422C.

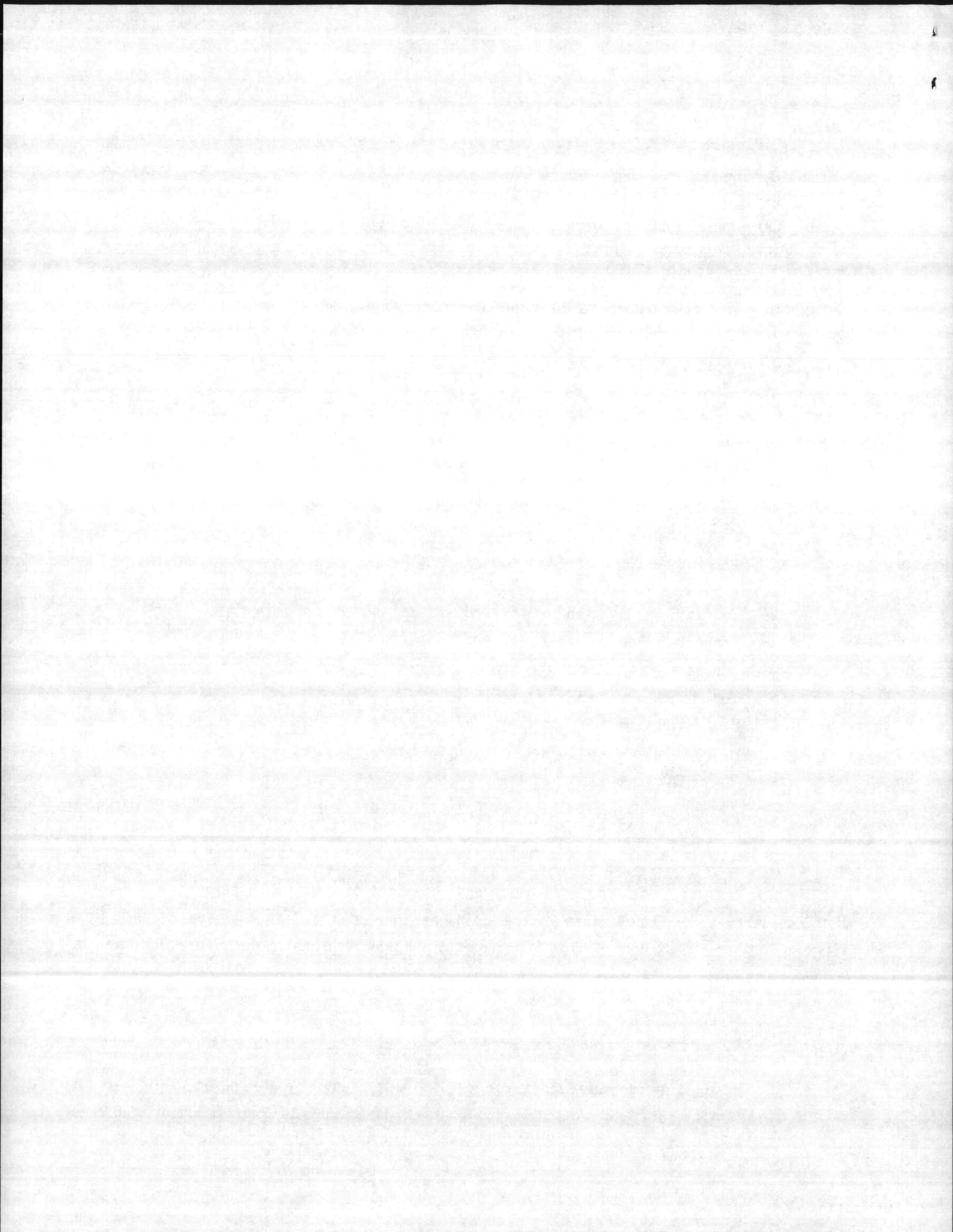
- f. For test, the vehicle was configured as follows:
 - Gun at zero elevation and forward with the muzzle cover in place.
 - Grenade launcher covers in place.
 - Windsensor up without the cover.
 - Turret lock engaged.
 - Hull drains open.
 - Hatches opened and locked.
 - Power OFF.

5.0 SALT FOG

The salt fog solution is defined as a 5 percent by weight of NaCl in 95 percent by weight of distilled water. The temperature in the exposure zone of the test chamber is maintained between 90°F and 95°F. Fog density is approximately 3 quarts of salt solution per 10 cubic feet of chamber volume per 24 hours.

6.0 TEST

- a. On 7-10-84, the vehicle was driven into the test chamber and exposed to the Salt Fog for 48 hour duration. Atomizers were checked periodically for a finely divided, wet,



dense fog. Temperature was maintained at 90-95°F, humidity 98°. At the end of the exposure, the Q.L-62 was repeated for comparison with results obtained during test preparation, para. 4.0. There were no changes in system status not previously recorded. Early stages of corrosion were visible on exposed metal parts. Blistering and porosity was also evident on some painted metal surfaces.

- b. The precleaner and "V" packs were removed, examined, and weighed. Each unit was found to have gained 1/4 lb over previously recorded dry weights. New units were installed to replace the old which were returned for laboratory analysis. Findings are a matter of record. The air box was found to be clean and dry.
- c. A five mile durability test was completed over a secondary road course with no irregularities noted.
- d. Para. 4c was repeated for analysis and historical record.

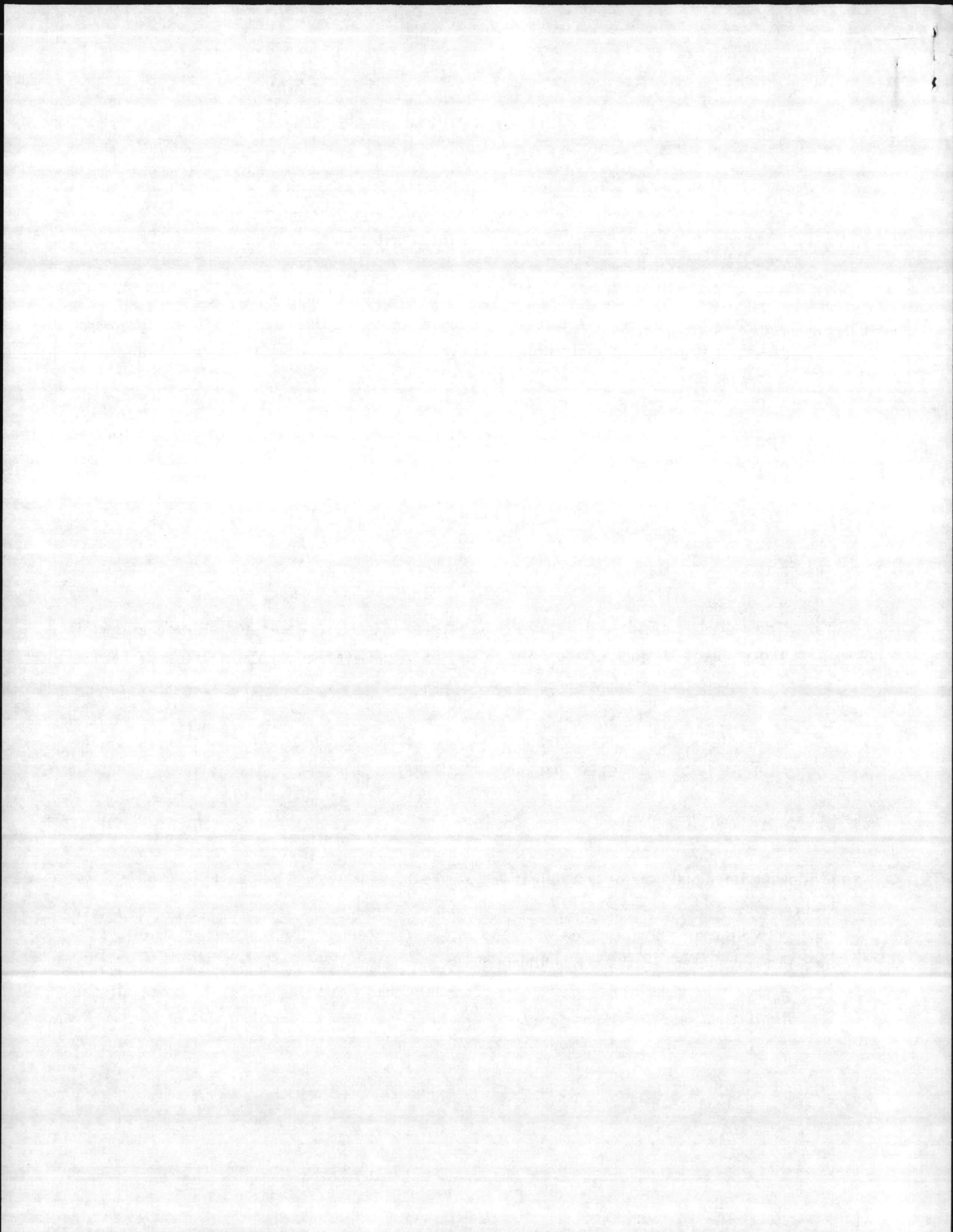
7.0 POST TEST

- a. The vehicle interior and exterior was washed with fresh water and allowed to dry in the ambient outdoor atmosphere to aid in visual inspection and to repeat characteristic photographs, para. 4b.
- b. Following a 48 hour driving period, the Q.I. 62 was repeated to meet the requirements of MIL-STD-810C with no change in system status.

8.0 SUMMARY OF RESULTS

The following immediate major test objectives were achieved:

- Vehicle engine performance was good with a start achieved on the first attempt.
- The computer self test passed during several checks.
- The 5 mile durability scenario over secondary road was successful with no operational limitations or deficiencies noted.



GENERAL DYNAMICS

Land Systems Division

P.O. Box 527, Warren, Michigan 48090

Inter-Office Memo

FB/86-78
29 May 1986

To: J. J. McCuen
xc: D. E. Brown, N. W. Hammes, H. J. Rinna, J. J. Ruma
Subject: IPMI Tank Precleaners

1. CONUS Field Operations received a report today from J. Roach, Site Supervisor at Camp Shelby, Mississippi, regarding a possible IPMI engine failure due to water ingestion through the precleaner and v-packs.
2. From the information gathered thus far, it appears that water (from heavy rainfall) is entering the air box and v-packs through the "new" type precleaner. This "new" precleaner is manufactured by Pall Land Marine Corp. and is only 3-1/2 inches thick as opposed to the "old" precleaner which is manufactured by Donaldson Corp. and is approximately nine inches thick. This difference in thickness (3-1/2" vs. 9") is thought to be allowing more water to pass through the thinner precleaner subsequently saturating the v-packs and leading to engine shutdown and possible engine damage.
3. J. Roach is currently generating a letter which documents two separate incidents occurring at Camp Shelby this past week. Each incident occurred due to heavy rainfall/water ingestion.
4. GDLS Camp Shelby personnel will continue to monitor and report on this situation as training activities continue at Camp Shelby and Camp McCain.



F. Bryan
Chief - CONUS
Field Operations

BK/km

Jeff White TACOM 21 Jun 86

EIR is over at PMO. He needs hardware to validate EIR. Until PM provides the hardware there is nothing he can do. Maj Bell & Cpt Klein are handling the hardware issue.

574-6442 Mr O'Hell
574-8195 Maj Bell

DISPOSITION FORM

For use of this form, see AR 340-15; the proponent agency is TAGO.

REFERENCE OR OFFICE SYMBOL

SUBJECT

Problems Encountered With M-1 Tank

FILE
INCOMING
STEEBY

TO
The Adjutant General
State of Mississippi
P.O. Box 2057
Jackson, MS 39216

FROM
Commander
1st Bn, 198th AR
P.O. Box 158
Amory, MS 38321

DATE 28 Aug 85

GMT 1

1. During M-1 sustainment training at Cp McCain, Mississippi on 24 Aug 85 units of my battalion experienced a situation that is very disturbing to me and causes me to question the reliability of the M-1 Tank in combat.
2. The battalion had twenty-six tanks being used in sustainment training of the gunner's and loader's stations. Training had gone well until approximately 1500 hours it began to rain and came a cloudburst for approximately thirty (30) minutes. It was estimated that two inches of rain fell in thirty minutes time. The tanks were moved from the training area to the road before the rain began, however, the rain came before all the tanks cleared the field where they were parked. Some of the engines were turned off when they were parked on the road and others were running when the engine aborted while the crews were attempting to move out of the field. None of the tanks had the air intake grill covered during the rain. When the parked tanks were started up, there would be a huge cloud of white smoke come from the exhaust and the engine would die. All crews were instructed to remove the air filters and check for water in the filter box. Seventeen of the twenty-six tanks had anywhere from two to four inches of water in the filter box. Those with water in the filter box were dried out by dipping out the water and using rags and sponges to dry out the filter boxes. Many of the filters were wet, however, they were put back in. After the filter boxes were dried out, there were no more problems with engines aborting.
3. Mr. Roach, the General Dynamics representative, was at Cp McCain during the weekend and is very much aware of what happened. He said that he would be in touch with his boss the first thing Monday morning concerning the matter. He believed that if the vehicles had been left running at Tactical Idle speed the water would not have entered the filter boxes. I know of at least two tanks that were idling at TAC IDLE and they aborted, therefore, that will not solve the problem. The operators manual does not provide instructions concerning the actions required during operation to prevent water from entering the air filter box during heavy rain. Immediate corrective action should be taken because training will be adversely affected, the cost of replacing filters when they get wet will be unbearable, and most importantly, we can't go into combat with a tank that will not perform in the rain.

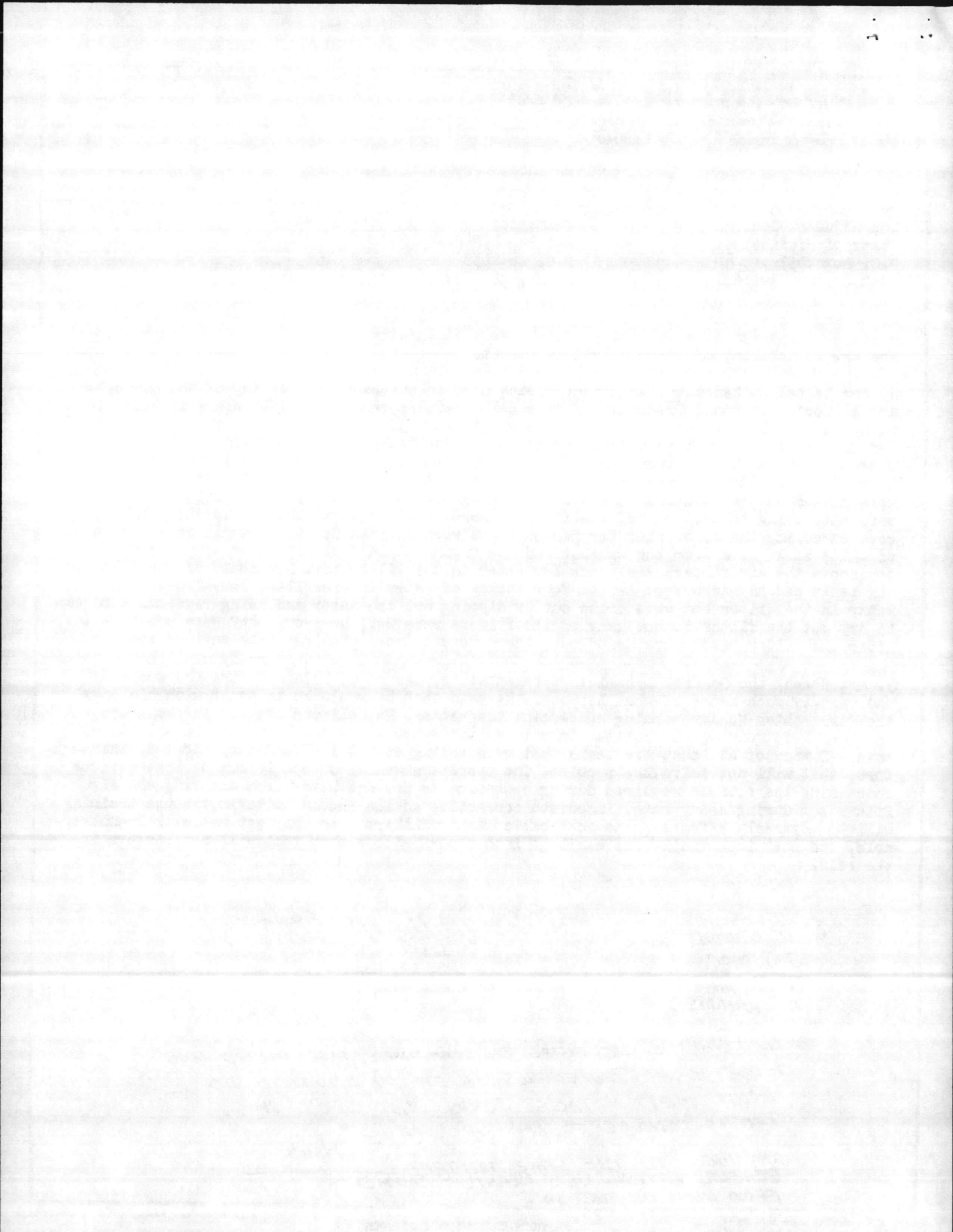
C. C. D. BROWN
J. J. McCUEU
J. RUMA
N. HAMMES

William H. Kent
WILLIAM H. KENT
LTC, AR, MSARNG
Commanding

10 OCT 85

Local PMD IS RESPONDING TO COMMANDER. ALSO ASKING WHY
THERE ^{ARE} NO PROCEDURES IN TM ON WHAT TO DO
ABOUT WET V PAC'S. JERRY JUST REC'D THIS.
PMD IS SENDING TO PMO UP HERE

THIS WENT TO THE STATE ADJUTANT
GENERAL. GETTING VERY NEGATIVE COMMENTS
FROM UNITS ON THE DM. HANK



Abrams Tank System
Situation Report
THU, 29 AUG 1985

Report No: 1740
From: LANE
Reported By: CPT KOEDDING

Report Date: 29 AUG 85
Report Time: 0815
Vehicle ID: N/A
Vehicle Miles:

Nature Of Report: ASAP (Response Is Required From: SI)

Report Pertains To: Performance

Incident Summary:

WATER IN AIR INDUCTION SYSTEM

Complete Incident Description:

DURING WEEKEND SUSTAINMENT TRAINING FOR CO C AND CO D 1/198 AR BN,

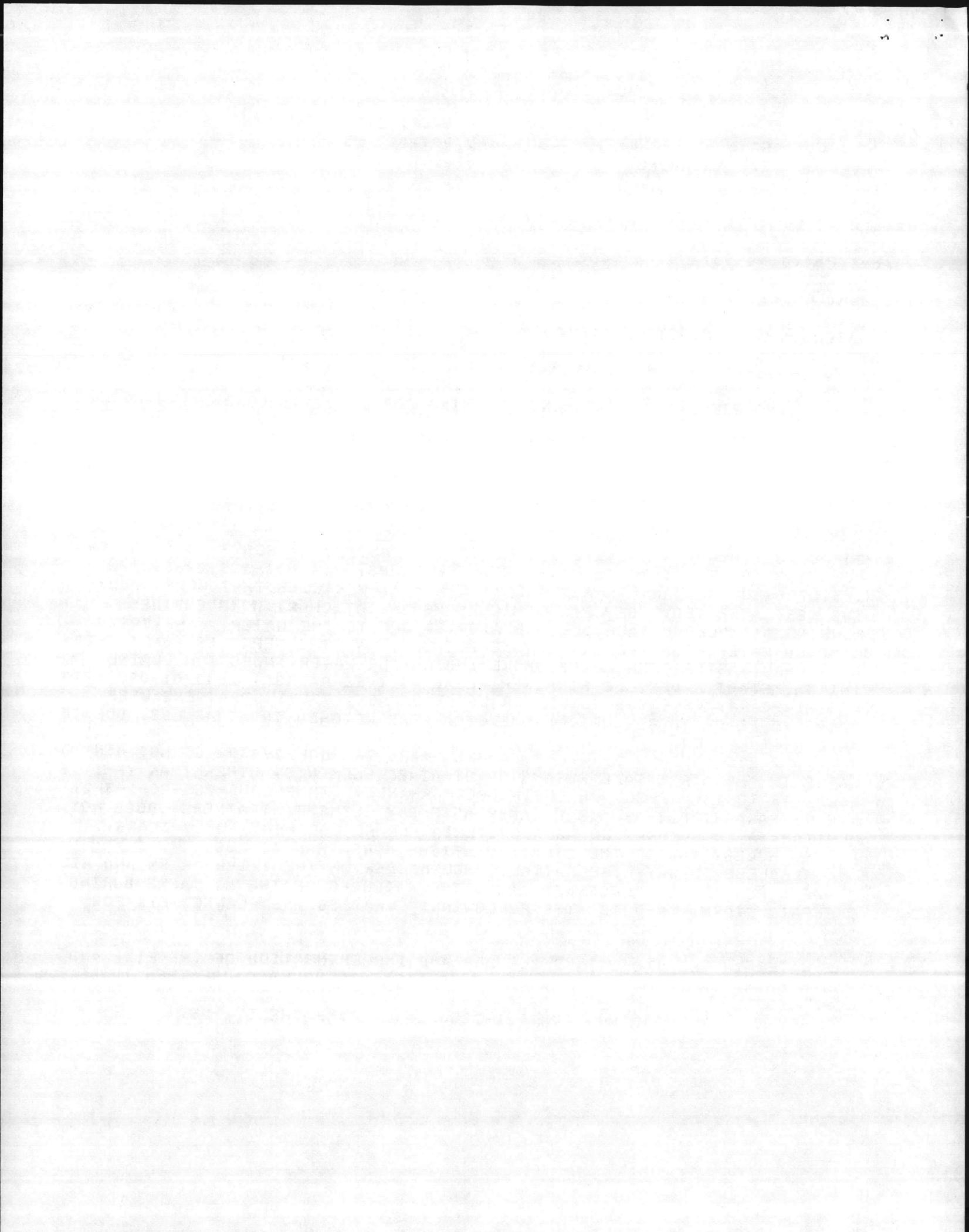
24 AUG 85, HEAVY RAIN (2-3 INCHES IN 45 MINUTES) CAUSED 3 TO 4 GALLONS OF WATER TO LEAK INTO THE AIR INTAKE PLENUMS, 2540-01-129-0265, P/N 12315788, OF M1 TANKS. ALL TWENTY-SIX (26) VEHICLES THAT WERE OPERATING WERE AFFECTED. SEVERAL VEHICLES WERE STATIONARY WITH ENGINES RUNNING AT IDLE OR TAC-IDLE AND ABORTED DUE TO THE WATER. THE CREWS REMOVED WATER FROM THE AIR INTAKE PLENUMS, AND THE VEHICLES FUNCTIONED AS NORMAL, ASIDE FROM WHITE SMOKE INDICATING WATER INJECTION DURING INITIAL START. VEHICLE STRAINER ELEMENTS (VEE PACKS), 2940-01-090-4490, P/N P14-0494, WERE INSPECTED FOR WATER DAMAGE. SOME STRAINERS WERE FOUND TO BE UP TO 25% WET. SOME STRAINERS WEIGHED IN AT 43 LBS, DUE TO WATER SATURATION.

TM 9-2350-255-10-2, W/C 3, PAGES 2-426 THROUGH 2-430, DO NOT MENTION WATER IN THE AIR INTAKE PLENUM OR STRAINER ELEMENTS, OTHER THAN IF IT'S COLD, AS TO THE AFFECT ON ENGINE PERFORMANCE. TM 9-2350-255-20-1-3-2, W/C 2, PARAGRAPH 3-6, AIR CLEANER ASSEMBLY ELEMENT STRAINERS, DOES NOT MENTION WATER SATURATION AS A CRITERIA FOR REPLACEMENT, ONLY TEARS, DENTS, HOLES, AND IF THE STRAINER WEIGHS MORE THAN 43 LBS.

NEEDLESS TO SAY, THE BATTALION COMMANDER OF THE 1/198 AR BN AND HIS STAFF WERE GREATLY CONCERNED ABOUT THE FAILURES OF THE M1 TANKS DURING THE RAIN STORM. REQUEST THE FOLLOWING: WHAT IS THE PLANNED FIX FOR

THE WATER IN THE AIR INTAKE PLENUMS AND IMPLEMENTATION OF THE FIX, AND HOW MUCH WATER DAMAGE TO THE STRAINER ELEMENTS WOULD CAUSE THEM TO BE REPLACED?

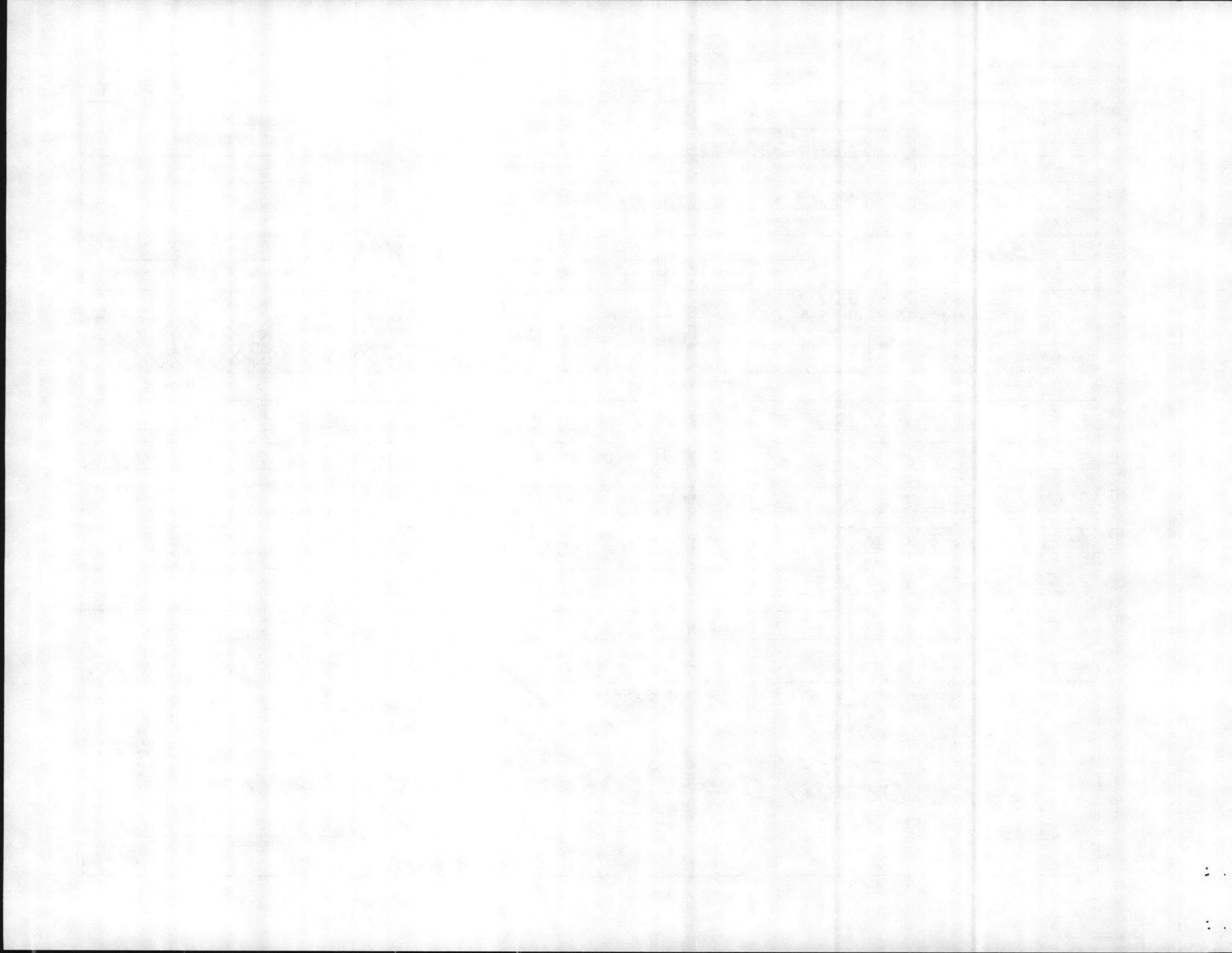
POC IS CPT KOEDDING, AVN 921-2280/2460, CAMP SHELBY, MS.



P.1

CARD CODE	NEW		TEST CODE	VEHICLE NO.	ITR NO.	INTERIM TEST REPORT				RELIABILITY DATA BANK INPUT FORM						
	REVISION															
		X		D5254	000100											
AA	14 EPW/OTIR NO.		20 INCIDENT DATE		26 PART NUMBER		60 NOMENCLATURE				61 VEHICLE SYSTEM					
			0824/85		2315789		AIR CLEANER INTAKE									
BA	14 VEH TYPE	18 VEH SERIAL	75 VEHICLE SUBSYSTEM			45 TEST/ROOM MILEAGE	50 RESP DEPT.	54 TEST LOCATION			66 TEST TYPE	70 CLASS				
	M1	L5254						CAMP MCCAIN								
CA	14 COMP S/Y FAR	20 GOVT GROUP	22 GFE CODE	23 CATEGORY	24 CHARG	25 MRF	28 MCK	33 WBS		41 PART USAGE	47 CLOSE-OUT DATE	53 COMP S/N NEW	59 FOUND DURING	60 BLACK BOX		
													0			
DA	14 S/U	17 MAINT LEVEL	24 DIAGNOSTIC TIME		34 REPAIR TIME		40 CHECK OUT TIME		54 IS PROBLEM							
		CREW/OR							NO							
HA	A. PROBLEM DESCRIPTION				B. POSSIBLE CAUSE				C. REPAIR ACTION				D. RECOMMENDATIONS			
	(A) APPROXIMATELY 3 TO 4 GALLONS															
HB	OF WATER IN AIR BOXES AND SATURAT															
HC	ED FILTER ELEMENTS.															
HD	(B) HEAVY RAIN STORM DURING VEHIC															
HE	LE OPERATION.															
HF	(C) REMOVED WATER FROM BOXES. MAI															
HG	NTENANCE PERSONNEL AUTHORIZED LIM															
ADDITIONAL COMMENTS/INITIAL RESPONSE																
THIS ITR APPLIES TO 26 Vehicles. L5259, L5265, L5283, L5286, L5293, L5297, L5304, L5314, L5315, L5317, L5318, L5321, L5328, L5333, L5334, L5336, D5280, D5281, D5287, D5292, D5299, D5311, D5312, D5320, D5313.																
PREPARED BY										DATE		APPROVED BY		DATE		
[Signature]										26 AUG 85						

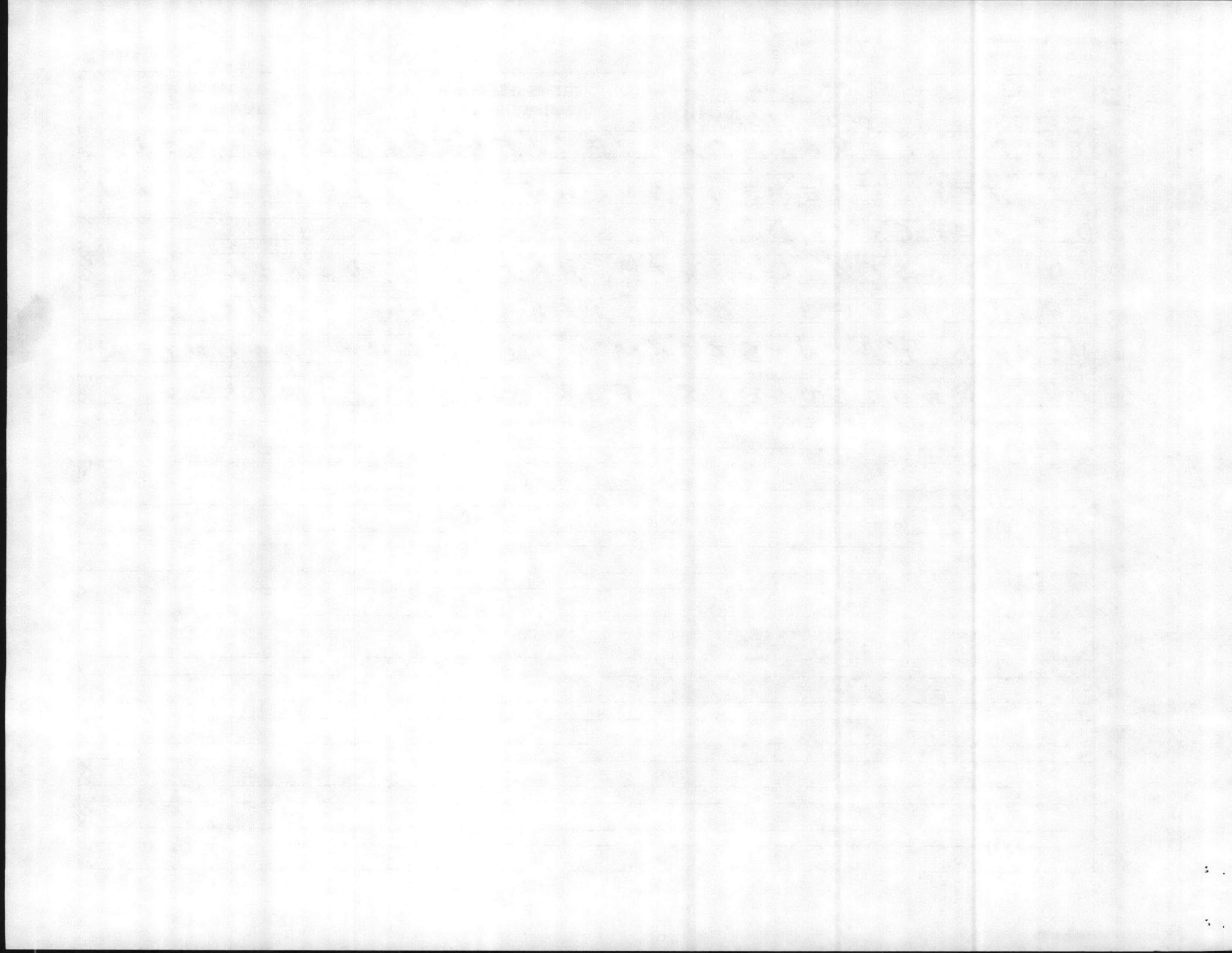
AUG 29 '85 13:44



CARD CODE	NEW	TEST CODE	VEHICLE NO	ITR NO.	INTERIM TEST REPORT CONTINUATION SHEET	RELIABILITY DATA BANK INPUT FORM
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IQ						

P.2

AUG 29 '85 13:45



GENERAL DYNAMICS

Land Systems Division

P.O. Box 527, Warren, Michigan 48090

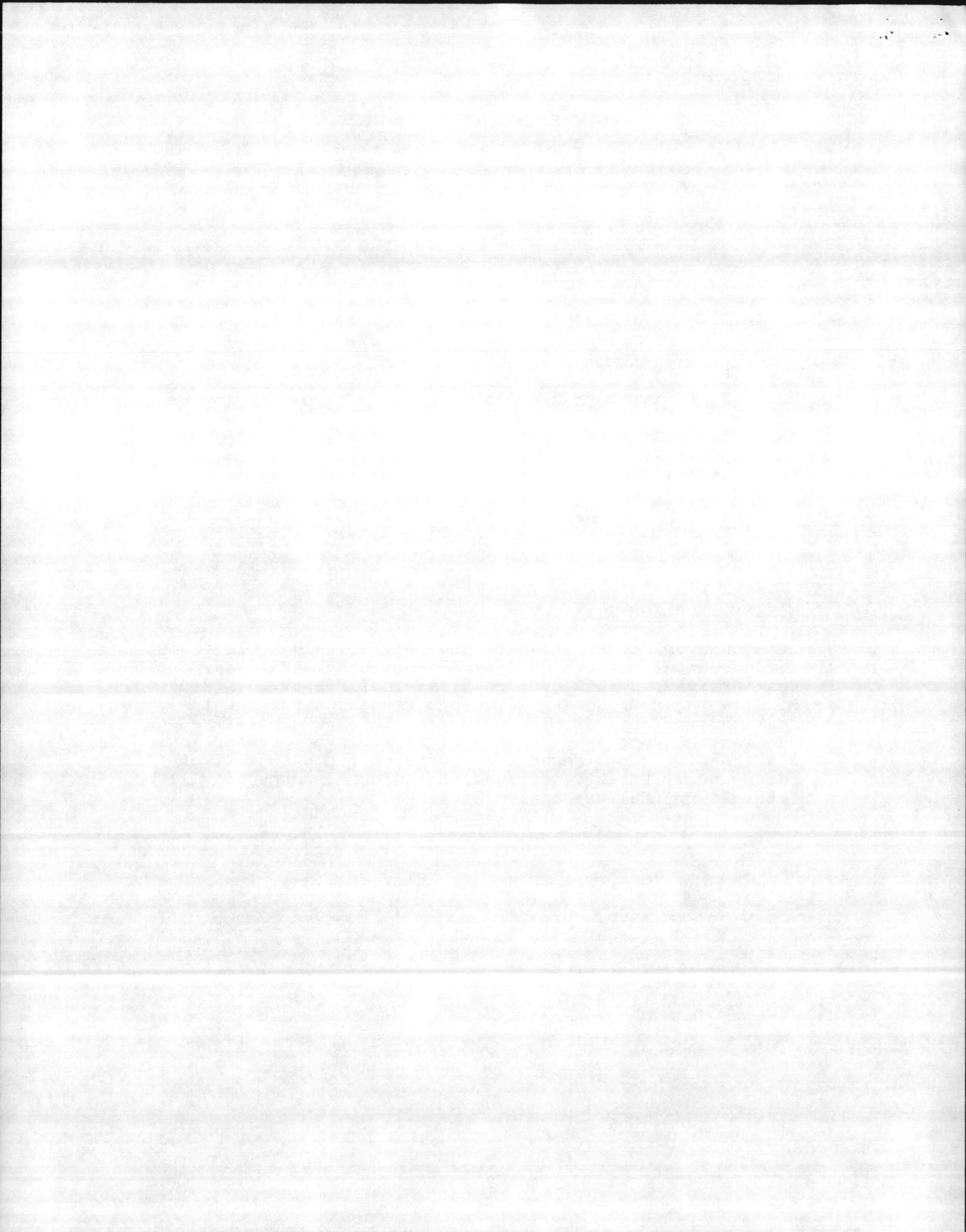
Inter-Office Memo

FB/dr:85-154
28 August 1985

To: J. J. McCuen
xc: D. E. Brown, H. J. Rinna
From: F. Bryan
Subject: Weekly Activity Report: 22 - 28 August 1985

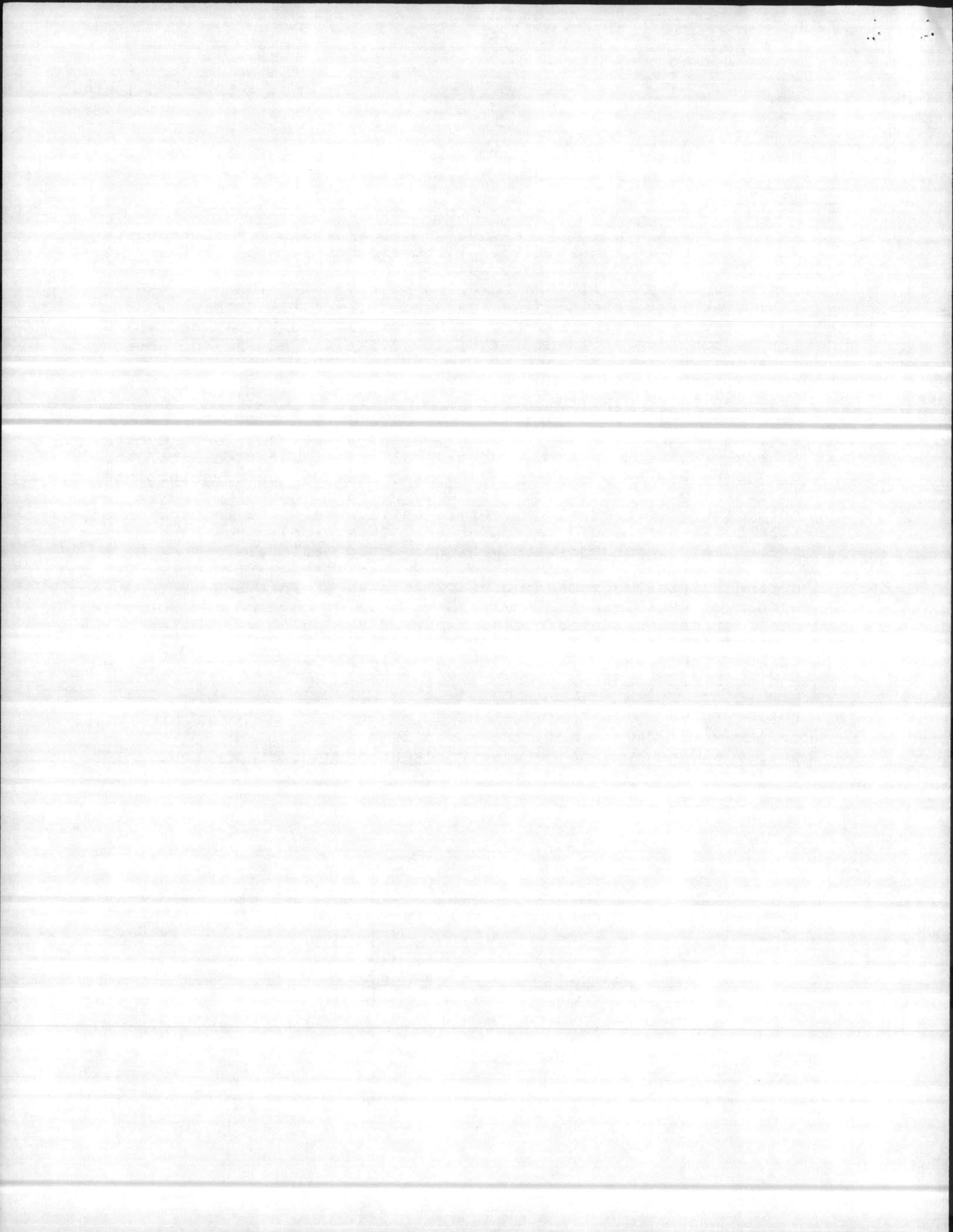
1. WEEKLY HIGHLIGHTS

A second vehicle fire occurred on D-1265, a vehicle belonging to 2nd Battalion, 8th Cavalry at Fort Hood. Fire inspection team arrived on 26 August consisting of Messrs. G. Frenette, F. Siano, and G. Weber. Findings revealed that raw fuel was leaking from the AGB hole below the HMU and a positive leak between the upper and lower half of the high pressure quick disconnect is considered the second source of the fire. The rotary pump, PN 12284468, and the quick disconnects will be returned for failure analysis.



KEY ISSUES

- A. Two (2) additional APUs, S/N 00104 and S/N 00105, were received at Fort Knox on 26 August 1985. There are now a total of four (4) APUs on site. A joint inventory was conducted by GDLS and government representatives. All integration parts, to include the shortages from the first shipment, are on hand. Three (3) GDLS representatives, Mr. W. Sugierski, Mr. C. Szabelski, and Mr. G. Rudish, arrived on site 26 August, 1985 to assist and advise the government personnel during the installation of the APUs. As of this date, one (1) APU has been mounted. The remaining vehicles are being prepared to receive the APUs.
- B. Weekend training at Camp McCain was suspended on 8-24-85 due to a heavy rainstorm that caused 3-4 gallons of water to enter the air boxes and saturated the V-packs of all 26 vehicles involved in training. After water was removed, maintenance personnel authorized limited use of vehicle until a detailed inspection of filter elements could be conducted. This problem has caused a great deal of concern with National Guard officials.
- C. During initial deprocessing of IPM1 tanks at Fort Stewart, GA, a number of vehicle deficiencies have been discovered and corrected. The most serious deficiencies reported during this time period have been seven (7) vehicles having final drive oil contaminated by water. The final drives on these vehicles were drained, flushed, and refilled with the proper lubricant.
- D. L-5107 is being shipped from WSMR to Fort Bliss, Texas for two (2) or three (3) days. A firing range is being built at Fort Bliss, Texas, and tank is to be used for setting up firing range.



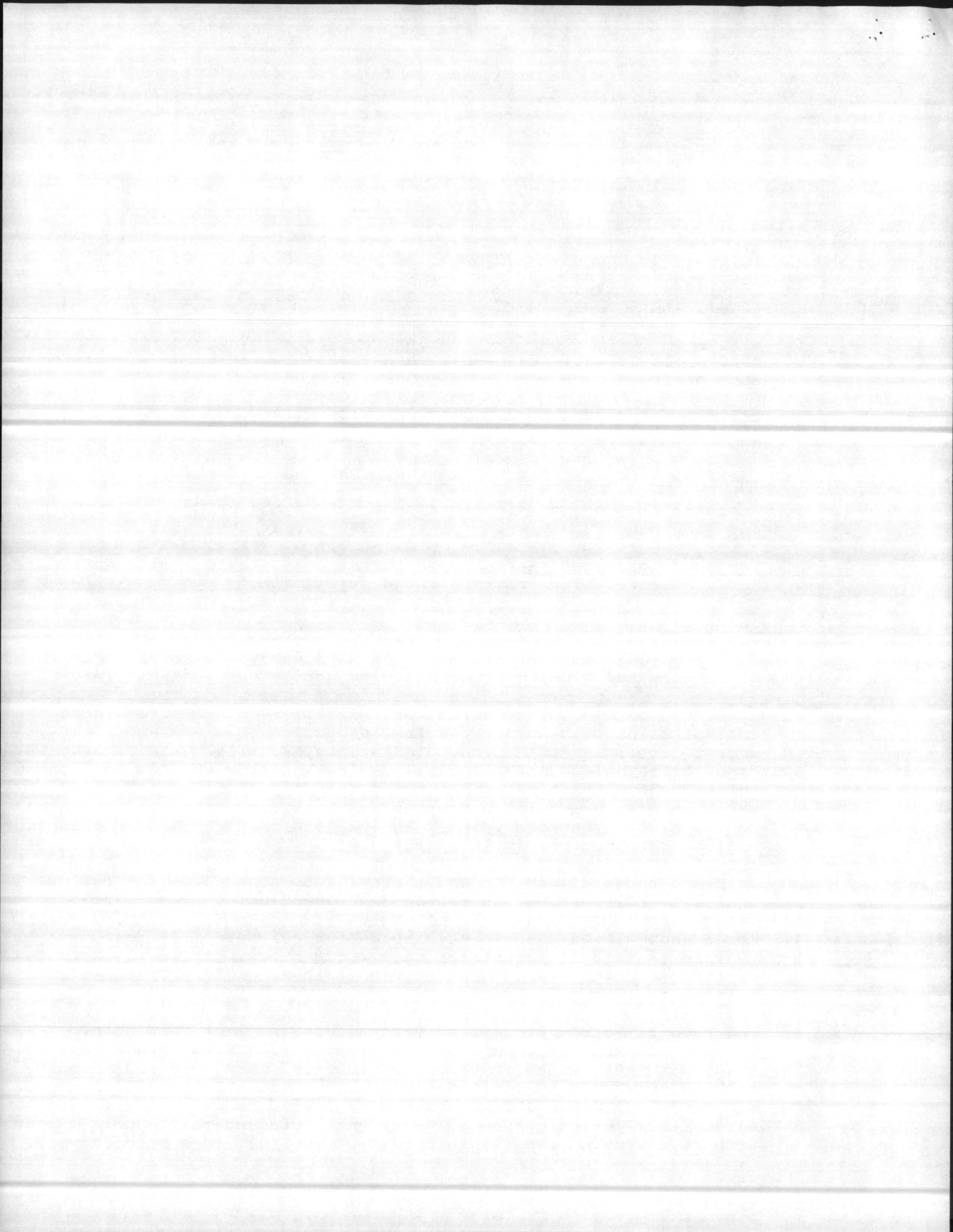
PROGRAMS

A. ANAD

1. Attended a meeting with ANAD publications and quality personnel to discuss turret preshop analysis DMWR validation equipment requirements.
2. Discussed turret test station components for MZAD station with ANAD engineering. Assisted with data clarification and locating appropriate sources.
3. Collected and submitted M60-A3 mortality lists for GDSC Egyptian program engineering personnel.
4. Assisted ANAD with preshipment preparations on D-757.
5. Assisted ANAD engineering with checkout of the bridge telescope and wind sensor test unit for the MZAD turret test station.
6. Prepared, packaged, and shipped turret test station components to GDLS Center Line for repair and adjustment.

B. FORT HOOD

1. Submitted QDRs on hose assembly, PN MS 8006M505CB, torsion bars, elevation and azimuth servos and fire bottle valve assemblies.
2. A second vehicle fire occurred on D-1265, a vehicle belonging to 2nd Battalion, 8th Cavalry. Fire inspection team arrived on 26 August consisting of Messrs. G. Frenette, F. Siano, and G. Weber. Findings revealed that raw fuel was leaking from the AGB hole below the HMU and a positive leak between the upper and lower half of the high pressure quick disconnect is considered the second source of the fire. The rotary pump, PN 12284468, and the quick disconnects will be returned for failure analysis.
3. Obtained three (3) servos and three (3) torsions bars for failure analysis. Disposition instructions are pending.
4. Total accumulated track test mileage for all seven (7) test vehicles, as of 28 August 1985, is 4,528 miles. Three (3) strands of 158-H FMC improved track arrived 26 August 1985. Track is being installed on L-6062.
5. ILS support to the Track Test Program continues at Fort Hood. During this reporting period, thirty-nine (30) RFPs were submitted, sixty-six (66) issues in various quantities were made and seventy-two (72) Class IX requisitions were submitted. Fifty (50) Class IX and three (3) Class III requests were filled or partially filled during this period. Five (5) shipments totaling thirteen (13) line were received and two (2) shipments of two (2) lines were shipped.



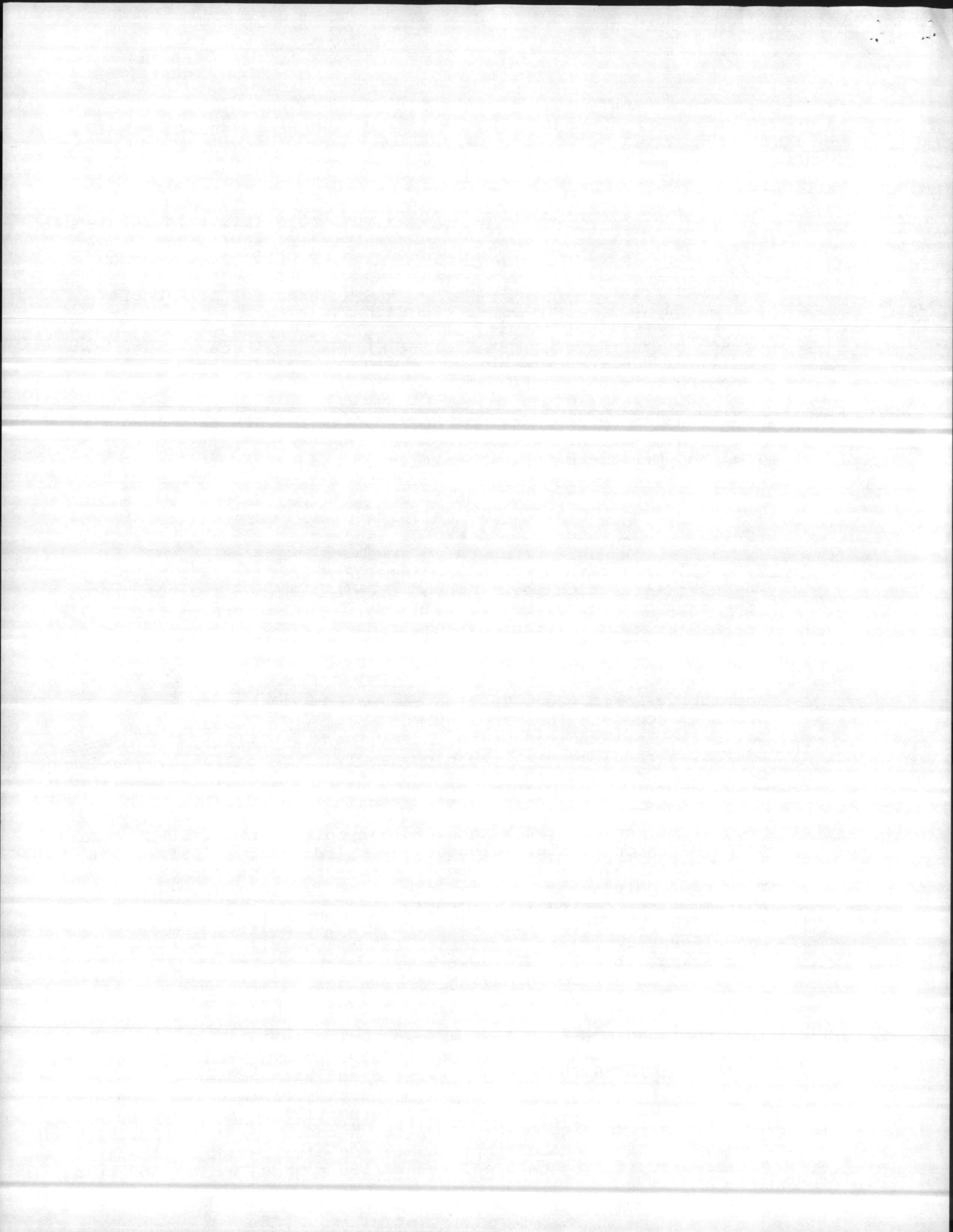
2. PROGRAMS - continued

C. FORT KNOX

1. Two (2) additional APUs, S/N 00104 and S/N 00105, were received on 26 August 1985. There are now a total of four (4) APUs on site. A joint inventory was conducted by GDLS and government representatives. All integration parts, to include the shortages from the first shipment, are on hand. Three (3) GDLS representatives, Mr. W. Sugierski, Mr. C. Szabelski, and Mr. G. Rudish, arrived on site 26 August, 1985 to assist and advise the government personnel during the installation of the APUs. As of this date, one (1) APU has been mounted. The remaining vehicles are being prepared to receive the APUs.
2. On 26 August 1985, three (3) hours of Basic Turbine Theory was presented to students attending the 1st Battalion, 1st Training Brigade M60-M1 transition course.
3. Per the request of Field Operations, a wire harness, P/N 5201JM-111182 and an NBC plug, P/N SK5201MM-07783, were shipped to Boise, Idaho, attention of Mr. J. Scholtz.
4. The failed turret race ring springs, P/N 8346341, and balls, P/N MS19059-2442, which were removed from L-217 (see ITR 002170003) were hand carried by Mr. W. Fitzgerald to Center Line, attention Mr. Henry Levine, Turret Systems Supervisor.

D. ABERDEEN PROVING GROUND

1. Automotive Performance Testing to include fuel consumption, braking, acceleration, and maximum speed were completed on ballistic test vehicle D-1661. Results are unknown. To meet test plan requirements, the disassembly of major vehicle component parts was completed to permit inspection and repair as required. The work is estimated to be 10% complete.
2. Two (2) of the FMC track tanks remain idle. Reworked FMC track is expected on 30 August 1985. The third tank, L-6055 is now idle. After 370 km since the last report, enough track has required replacement that failure criteria (20%) has been met and PMO is to decide if the FMC's "standard" is to be tested any further. L-6050, the baseline tank, completed the semi-annual service and has performed enough durability (366) to fail a generator, electrical repairs are underway. The heavy generator shaft had been removed during semi-annual service and one of original design was substituted. L-6036 received a replacement generator and has resumed durability. An in-tank fuel pump was also replaced. L-6051 lost a roadwheel spindle at Churchville and both #1 shocks at Perryman but also accumulated 240 kms. L-6064 completed semi-annual service and has completed 737 kms. at the cost of one comp idler arm and one deformed TAL-separate incidents on the right side. The Automotive Performance tank, L-6047, is receiving Diehl track for a roadwheel compatibility test. The Fire Control Performance vehicle, L-6052, commenced hit accuracy firing on Diehl track (100 rounds) but is now being



3. PROGRAMS - continued

D. ABERDEEN PROVING GROUND

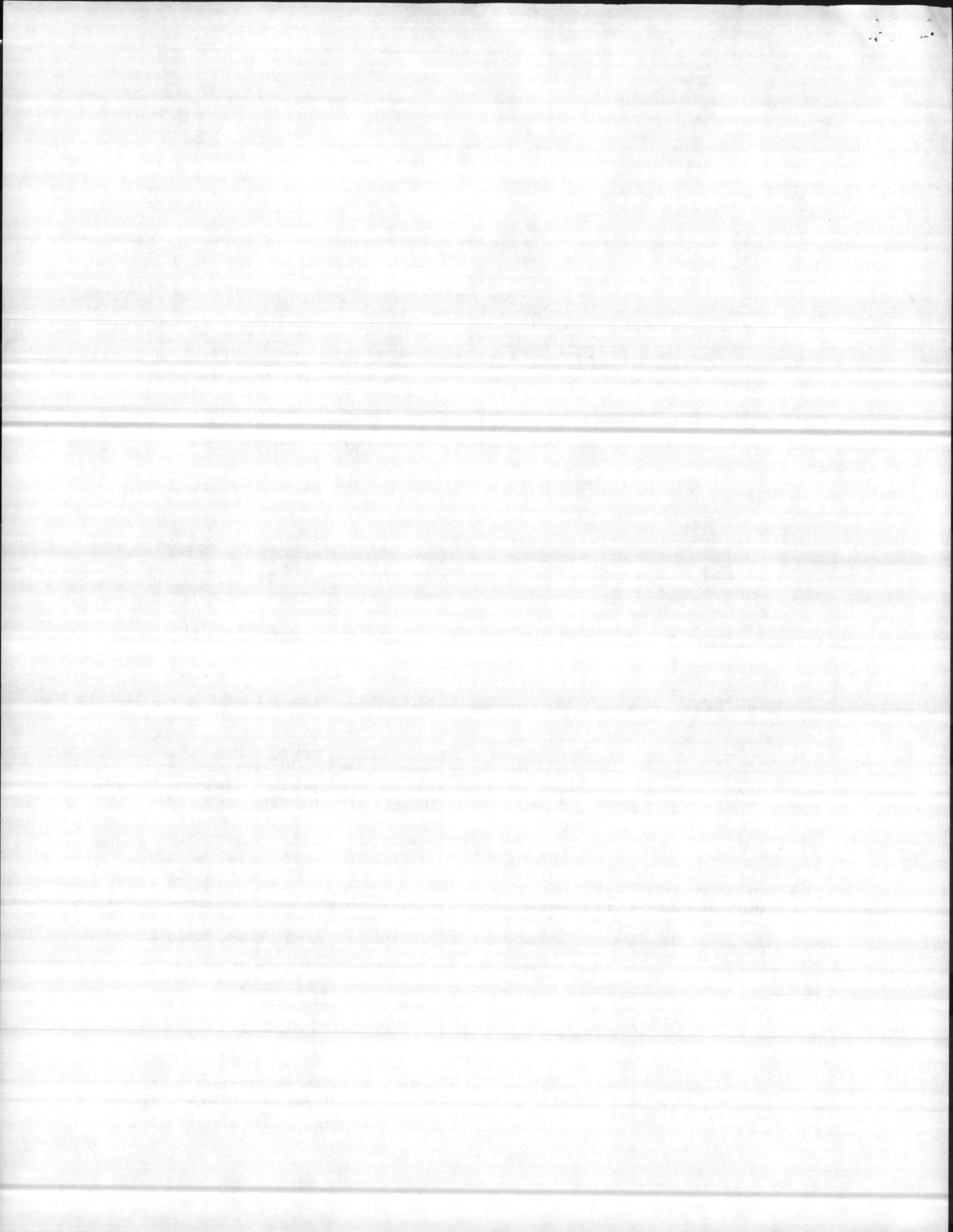
2. troubleshot/repared for an engine shutdown occurrence on 24 August 1985.
3. M1A1 vehicle 120-3 is now being instrumented with a thru sight camera and a telemetry data acquisition package for precision alignment technique testing scheduled to begin immediately. Vehicle 120-14 is being used to evaluate and qualify XM-865 ammo for a safety release. To meet objectives, toxic fumes testing has been completed. 120-7 was inspected with 170 discrepancies documented.
4. IPM1 L-5344 cold room testing was begun. IPM1 D-5373 is out of commission for a rear engine module. The new unit has been received from the depot with reassembly scheduled to begin on 27 August 1985.
5. ILS support to all APG and GDLS activities continued on a two (2) shift operation with twelve (12) incoming shipments (59 line items) and sixteen (16) outgoing shipments (44 line items) having been processed. One hundred and seventy-eight (178) items were issued from the ML MTSP and one (1) line item from M1E1 SSP. Fifty-two (52) reliability failed parts forms (RFPs) were processed. Shipped four (4) generators and eight (8) installation kits to Fort Hood and Yuma Proving Ground.

E. CAMP SHELBY

1. Crew training for "D" Company 2/198th Armor continues on schedule with only moderate vehicle malfunctions. During driver's training L-5267 experienced a track misguide causing only minor damage. Misguide has been attributed to terrain conditions.
2. Weekend training at Camp McCain was suspended on Saturday due to a heavy rainstorm that caused 3-4 gallons of water to enter the air boxes and saturated the V-packs of all 26 vehicles involved in training. After water was removed, maintenance personnel authorized limited use of vehicle until a detailed inspection of filter elements could be conducted. This problem has caused a great deal of concern with National Guard officials.

F. WSMR

1. L-6160 tank is at test location. Testing will start later this week.
2. L-5107 is being shipped to Fort Bliss, Texas for two (2) or three (3) days. A firing range is being built at Fort Bliss, Texas, and tank is to be used for setting up firing range.



. PROGRAMS - continued

F. WSMR

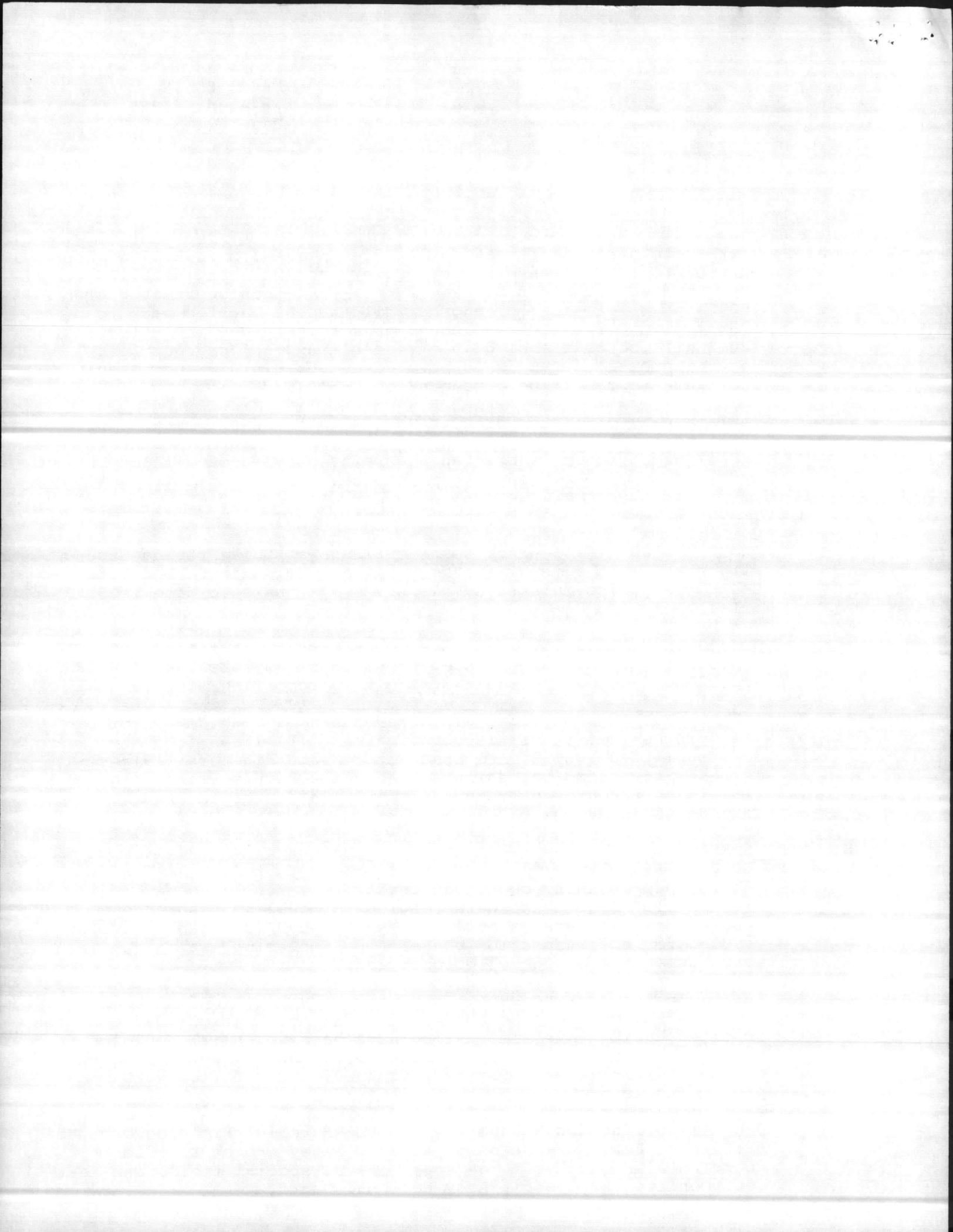
3. Work is to start next week on 120-2. Engine from L-5107 will be married to 120-2 transmission. Power pack will be installed in 120-2 and spec check run. Power pack will then be removed from 120-2 and split. L-5107 engine will then be married back to transmission of L-5107 and power pack reinstalled in L-5107. 120-2 will be reassembled unserviceable and shipped out for refurbishment. A GPS is to be ordered for L-5107, installed, and track test will be conducted on L-5107.
4. ILS activity continues with three (3) incoming shipments - five (5) line items - one (1) outgoing shipment - four (4) line items - one (1) spot report submitted and reinventoried of all GDLS parts made and copy submitted to home office.

G. YPG/TRACK TEST

1. The FMC/Diehl/T-156 track test continues at Yuma Proving Ground with six (6) of seven (7) IPML tanks participating. The total test mileage accumulated by all seven (7) tanks to date is 5,637 miles.
2. D-6053 is down awaiting a replacement test track strand (FMC improved). D-6046 experienced front shock failures and D-6058 experienced an engine fault during this reporting period.
3. ILS support personnel processed seventeen (17) shipments of twenty-nine (29) items; issued eighteen (18) items from the SSP, submitted two (2) ILS Spot Reports and nineteen (19) requests for items for failure analysis. Requisitioned eighteen (18) items through government channels and turned in four (4) components for repair.

H. FORT STEWART

1. Initial deprocessing continued during this reporting period. Fifteen (15) IPML tanks were readied for quality assurance inspection. To date, a total of twenty-four (24) tanks have been readied for the inspection phase of deprocessing, which has been rescheduled to commence 2 October 1985.
2. During initial deprocessing, a number of vehicle deficiencies have been discovered and corrected. The most serious deficiencies reported during this time period have been seven (7) vehicles having final drive oil contaminated by water. The final drives on these vehicles were drained, flushed, and refilled with the proper lubricant.
3. Jim Lillibridge and Roland White, GDLS Material Fielding Department, arrived at Fort Stewart on 27 August. They are on site to coordinate and hand-off the spare parts, special tools, and test equipment to the Georgia Army National Guard.



. PROGRAMS - continued

I. GOWEN FIELD

1. Vehicle 120-9 has accumulated 565 kms. to date. An engine failure occurred on the evening of 26 August 1985. Thirteen (13) quarts of oil was either consumed or drained (due to leakage) in a two (2) mile run. Engine failure evaluation has begun. The source of oil consumption has been determined to be the Westinghouse alternator. Support equipment (ground hop kit, with air filter, NBC plug and cable) has been expedited to be on site 28 August 1985 for power pack removal.
2. Six (6) shipments have been processed consisting of nine (9) items, and ILS personnel submitted two (2) ILS Spot Reports and a request for an item for failure analysis.

J. HOME SUPPORT FIELD OPERATIONS

1. Researched part number information for the IPM1/M1A1 turret bustle rack and supplied to Fort Stewart personnel.
2. Reviewed the final input data for LMR #50 and submitted changes to final print.
3. Submitted final megger report from Fort Hood showing all M1 tanks requiring this check have been completed at least once.
4. Provided an ILS layout and description for the publication of a brochure by the Marketing Department.
5. Coordinated the ILS activities and status report regarding Bendix alternator failures and shipments as well as the Westinghouse alternators and kits, with GDLS management, PM-Tanks personnel, and those test sites involved.
6. Expedited various in-house and test site shipments.
7. Processed nine (9) ILS Spot Reports of twenty-three (23) line items, and five (5) requests for reliability failure analysis items totalling fifty-nine (59) line items and routine scheduled administrative reports.
8. Edited, proof read, and distributed 127 engineering logs to GDLS management and PMO.
9. Submitted company car weekly mileage report to Building 850.
10. Distributed the M1 vehicle non-operational report to GDLS management.

